

FIG. 1

2/74

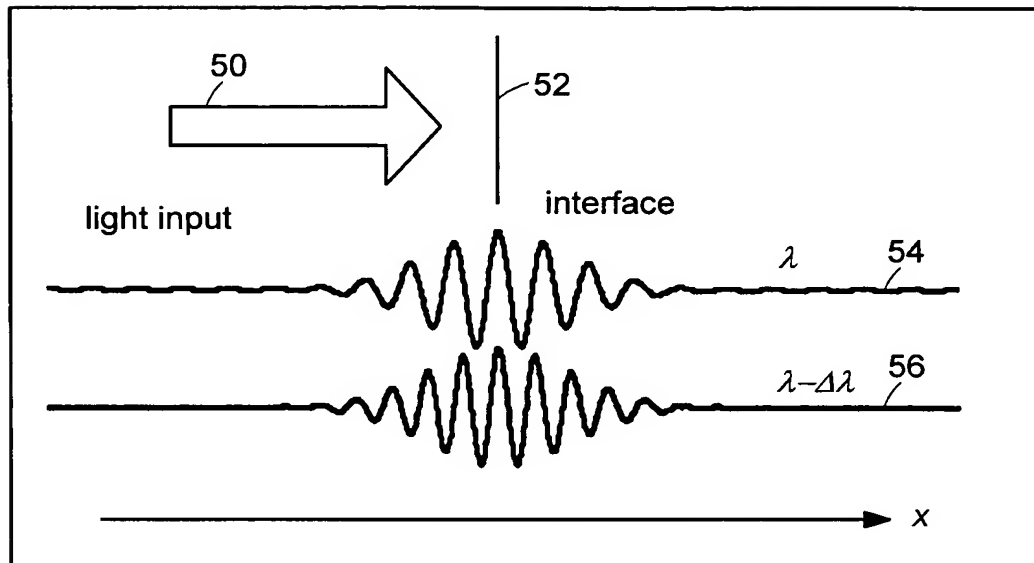


FIG. 2

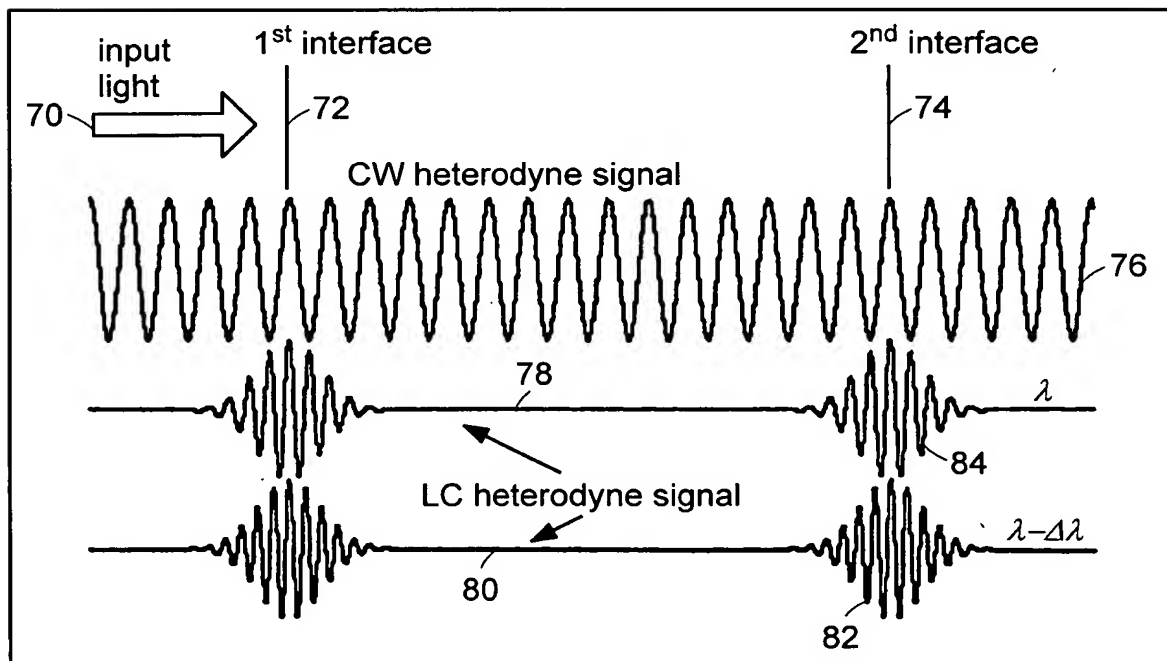


FIG. 3

3/74

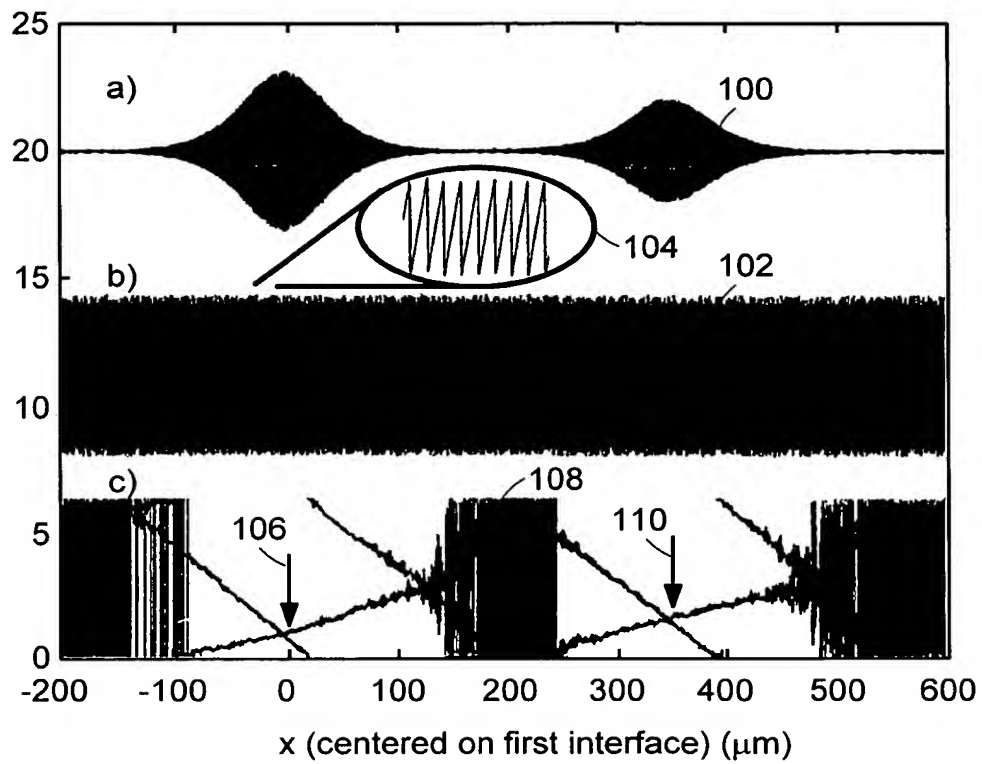


FIG. 4

4/74

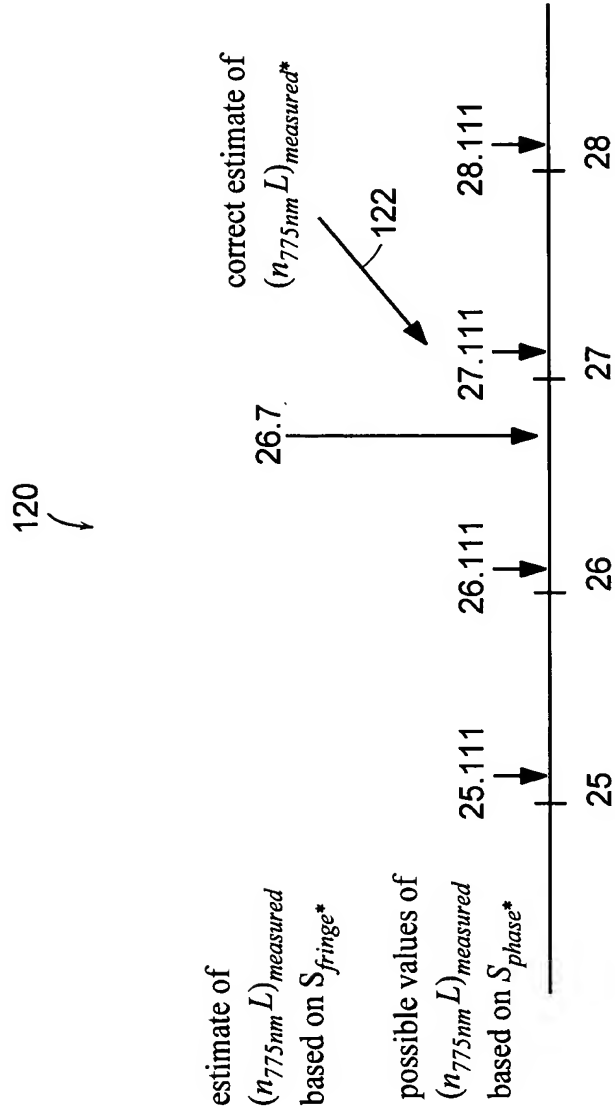


FIG. 5

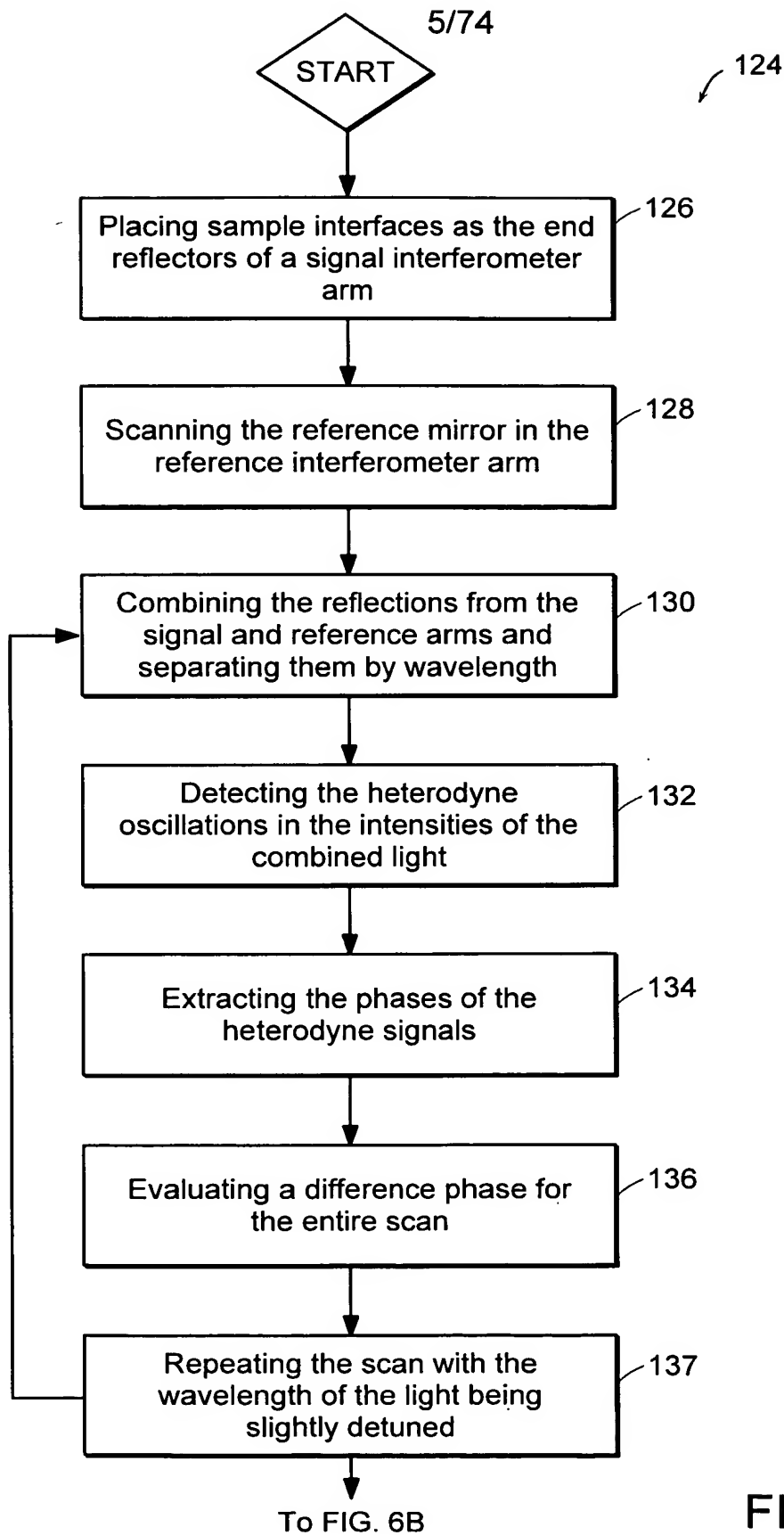


FIG. 6A

6/74

From FIG. 6A

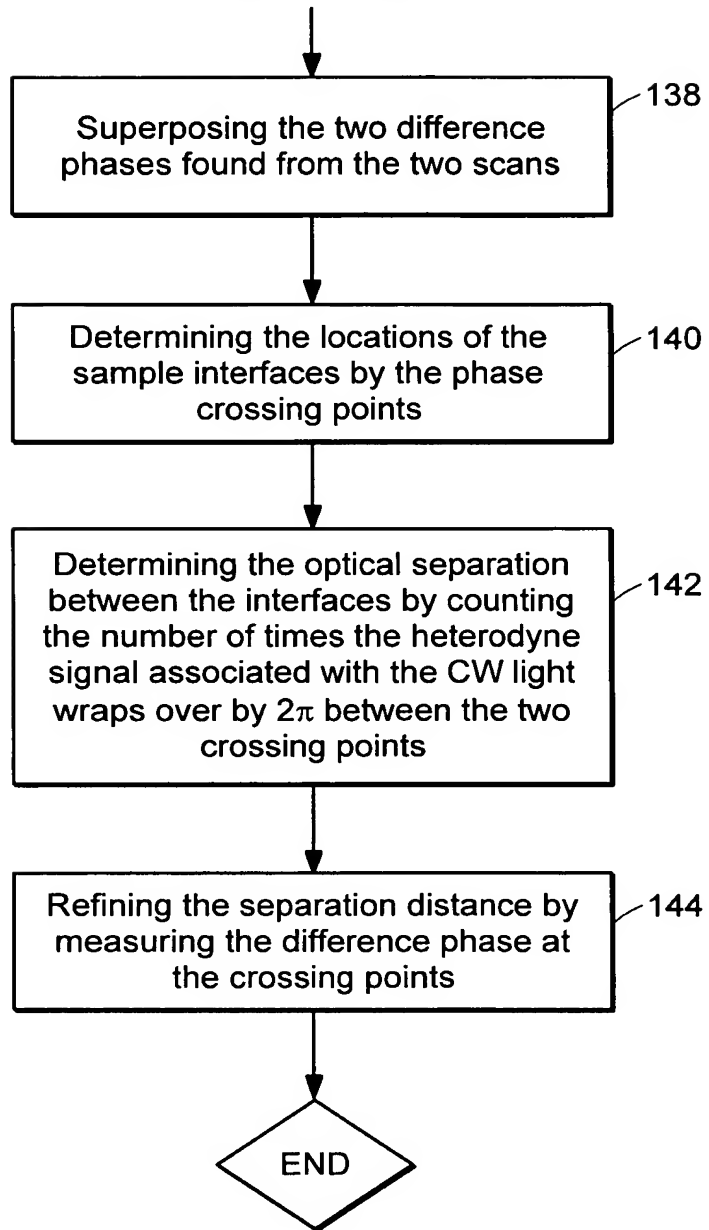


FIG. 6B

7/74

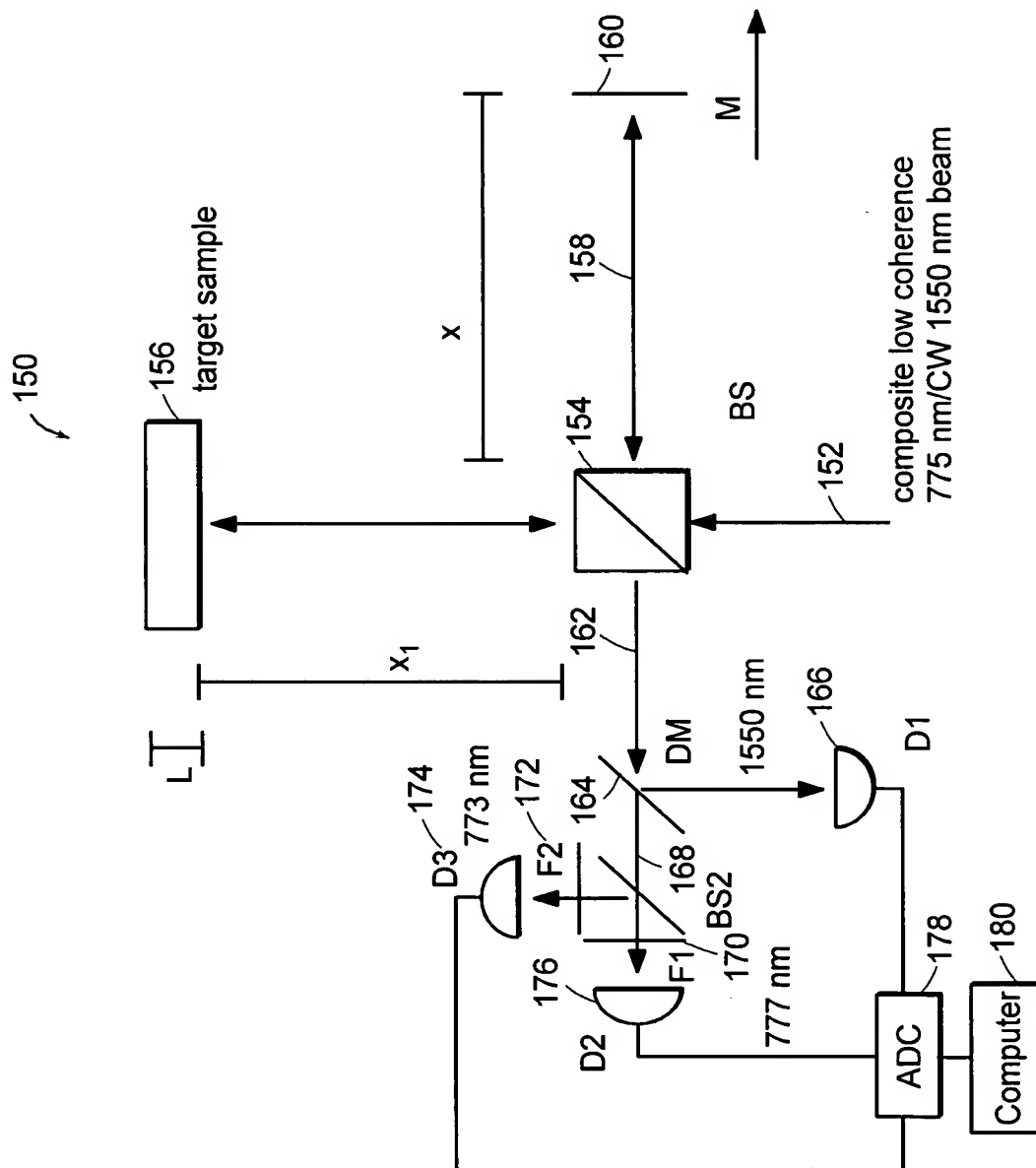


FIG. 7

8/74

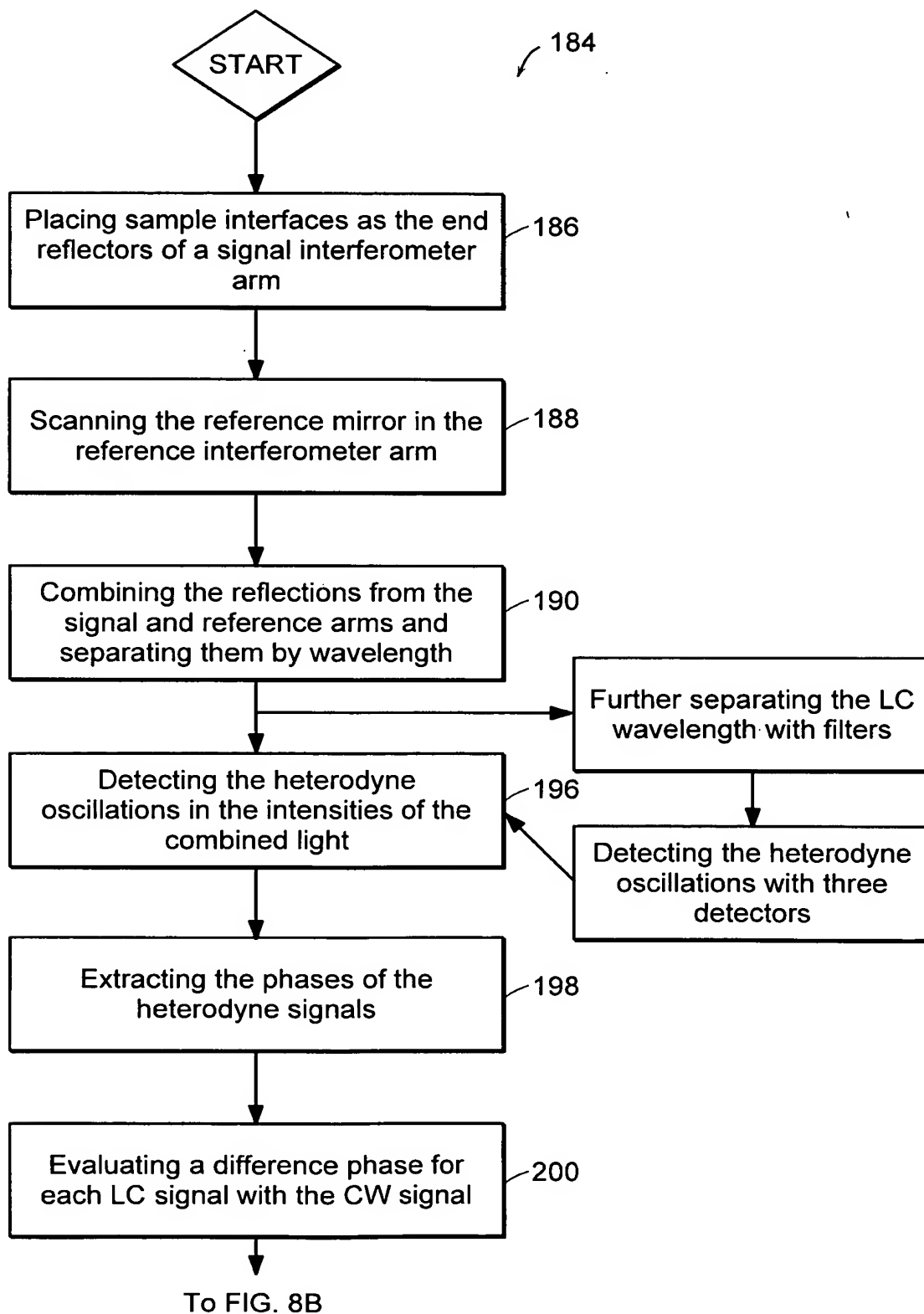


FIG. 8A



9/74

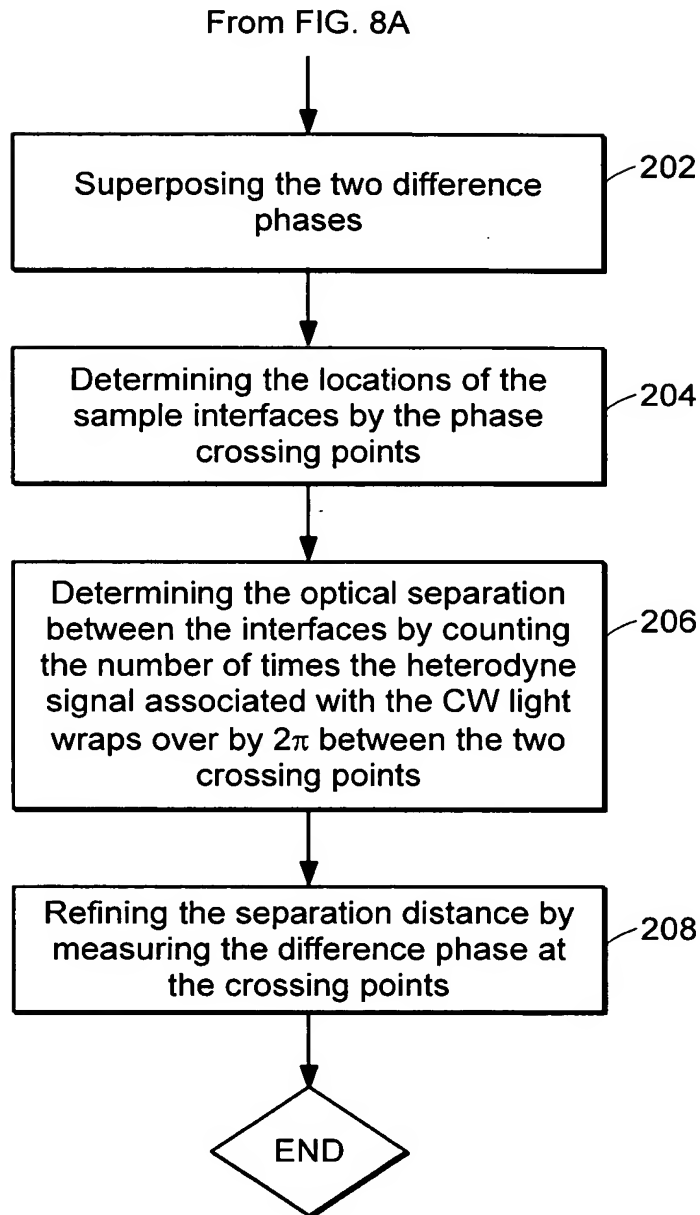


FIG. 8B

10/74

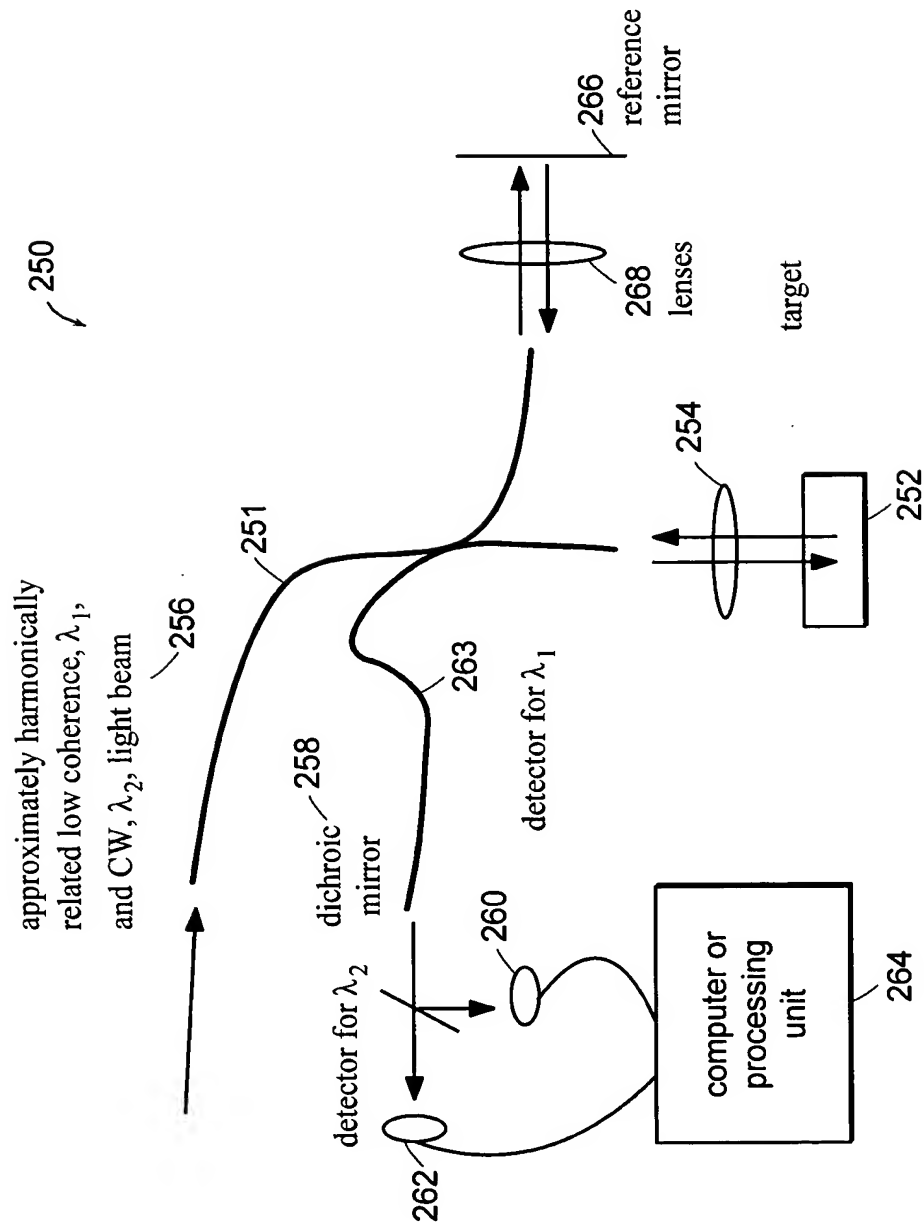


FIG. 9

11/74

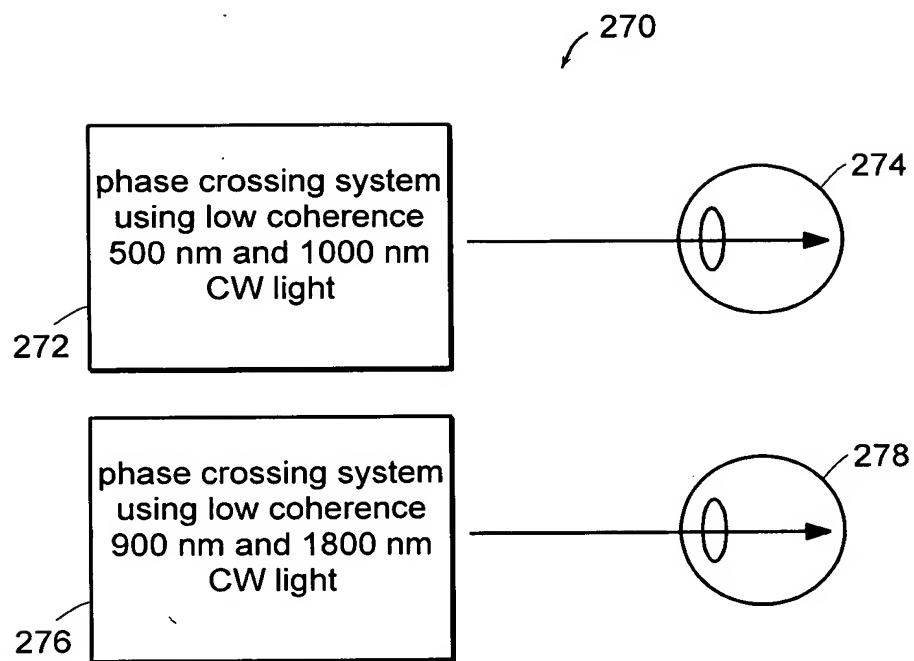


FIG. 10

12/74

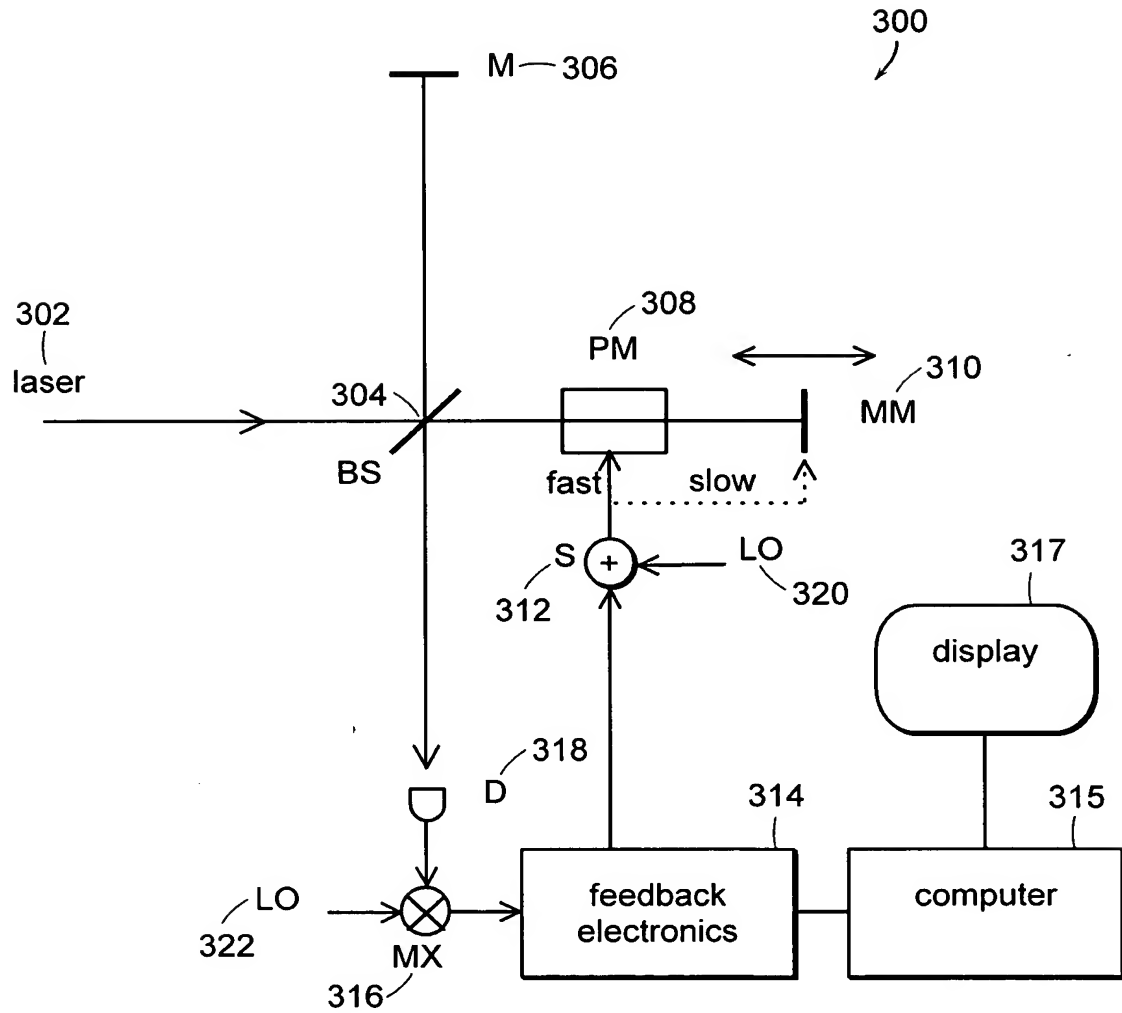


FIG. 11

13/74

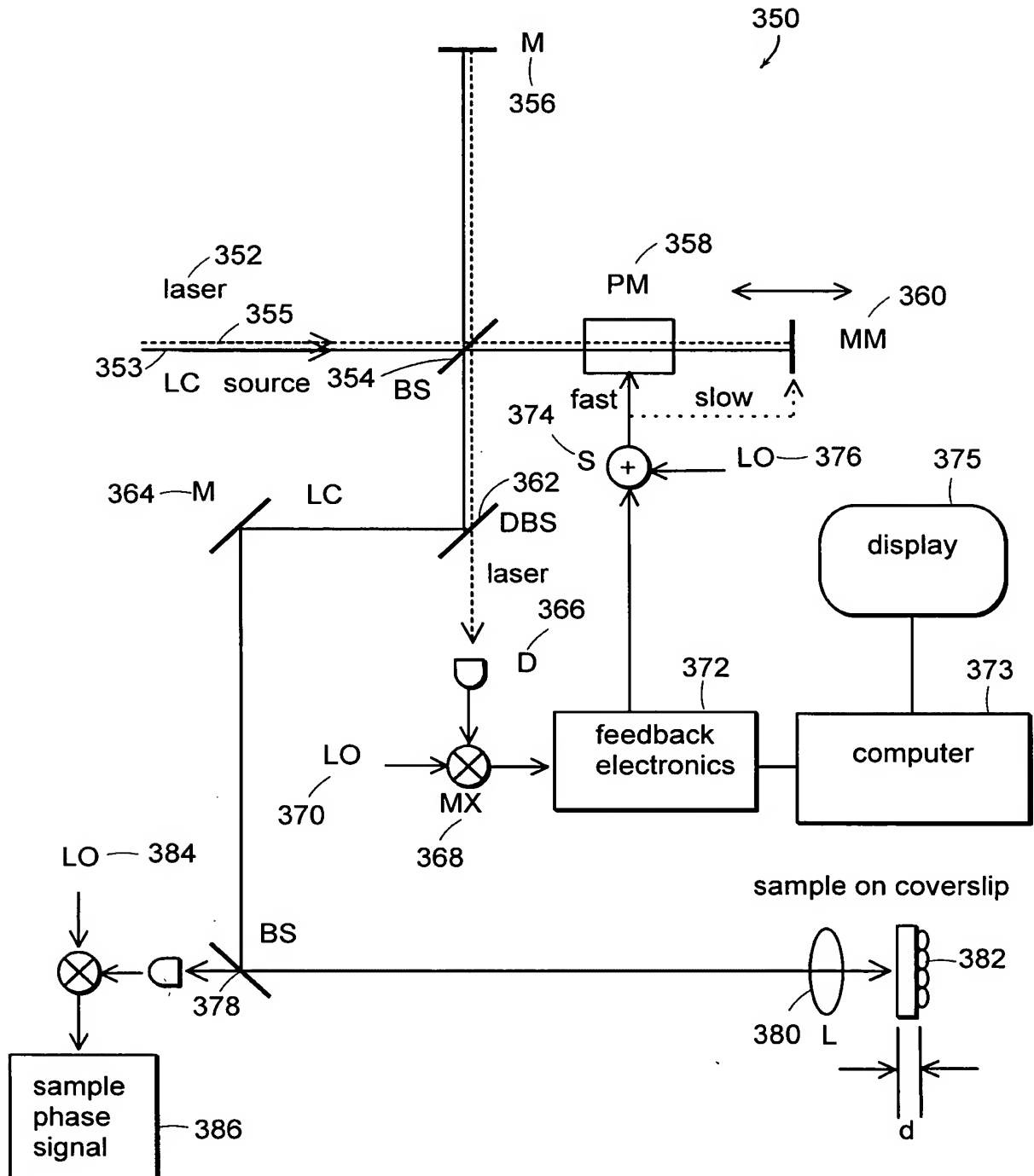


FIG. 12

14/74

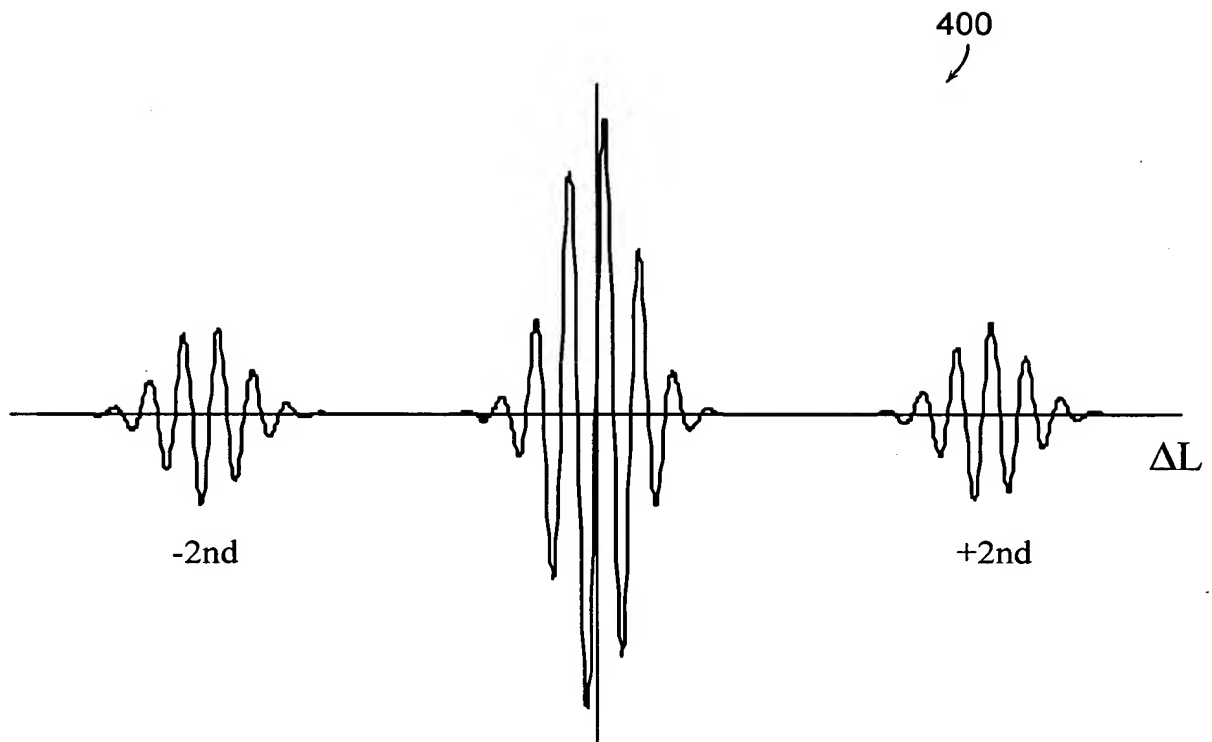


FIG. 13

15/74

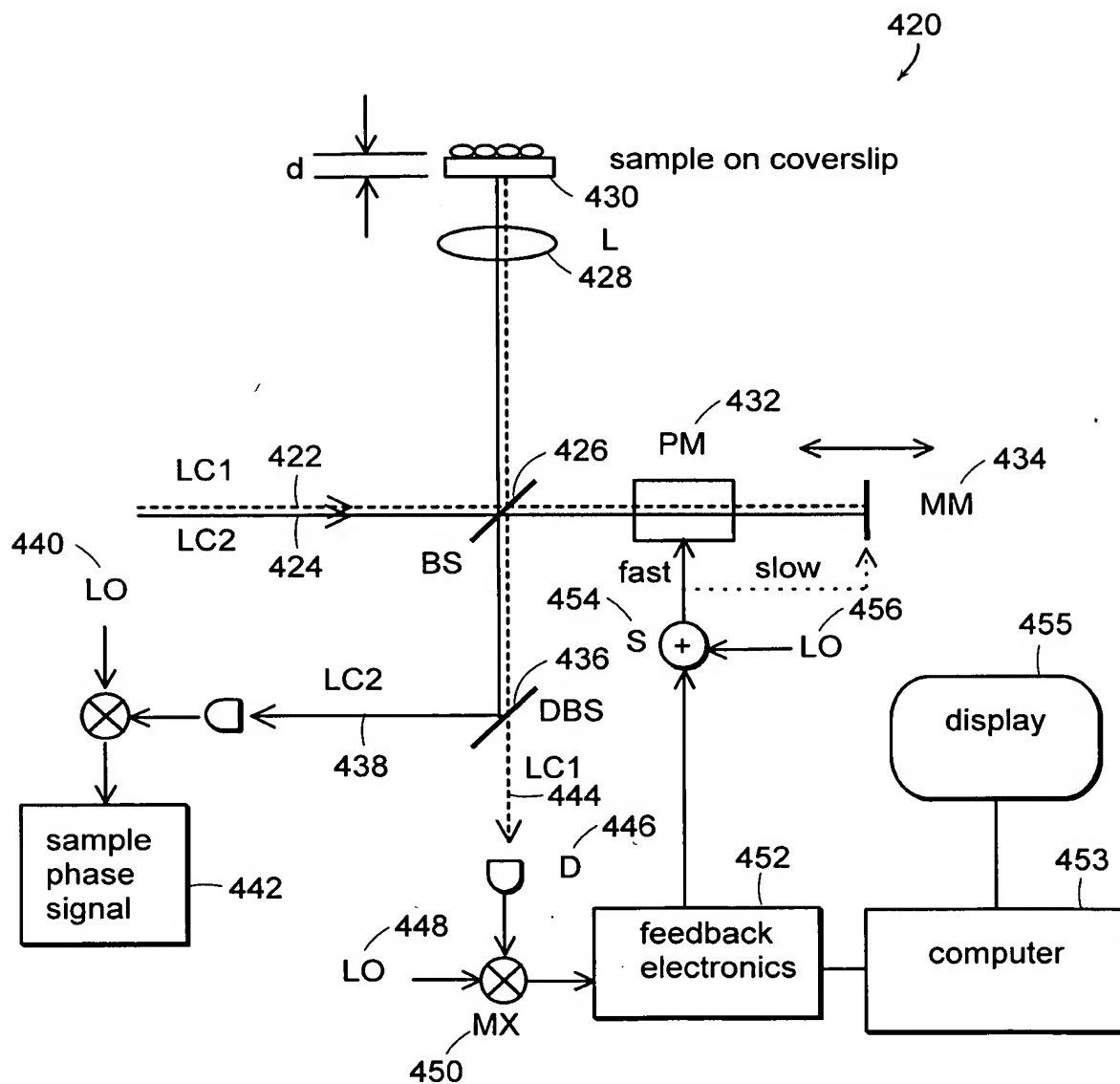
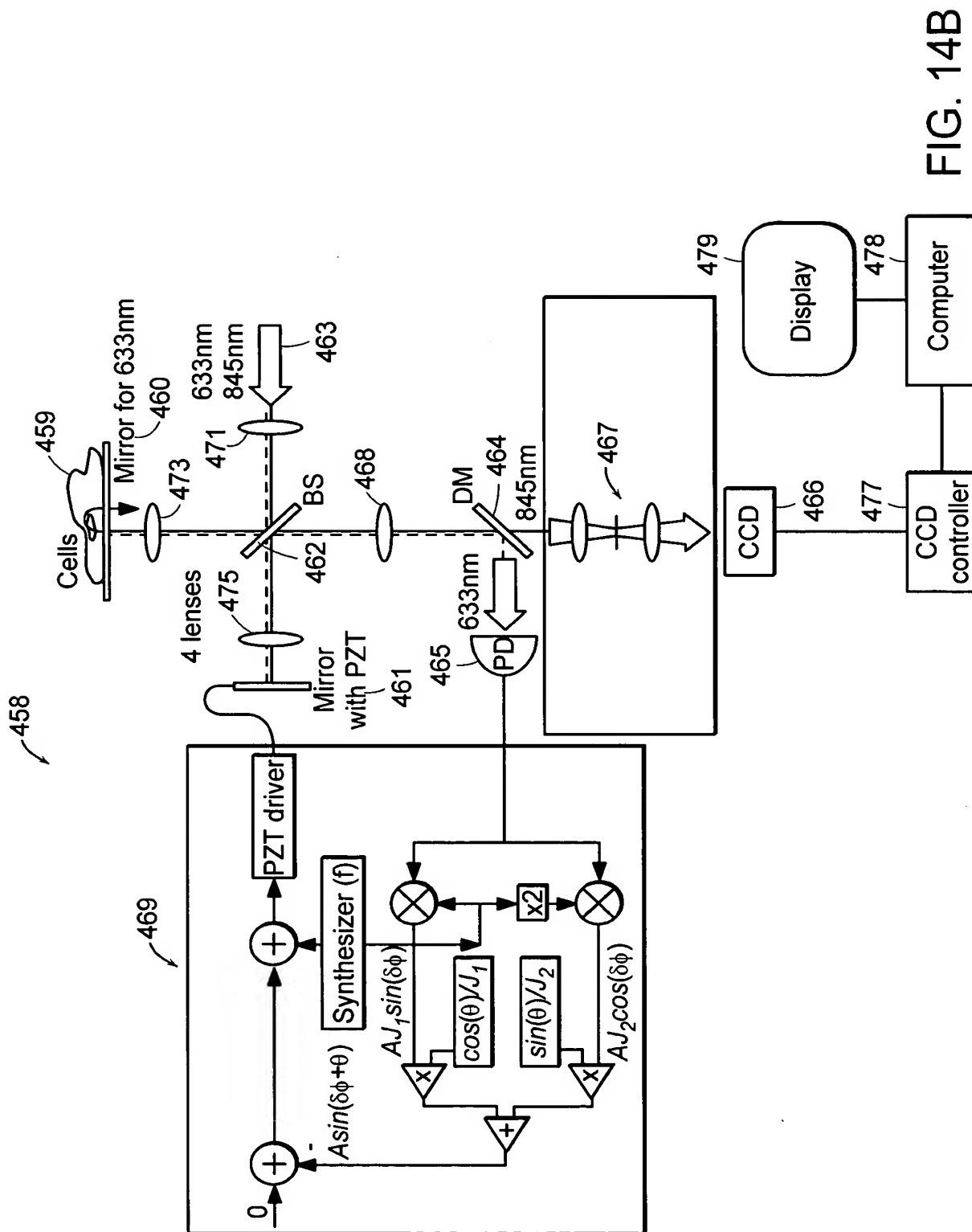


FIG. 14A

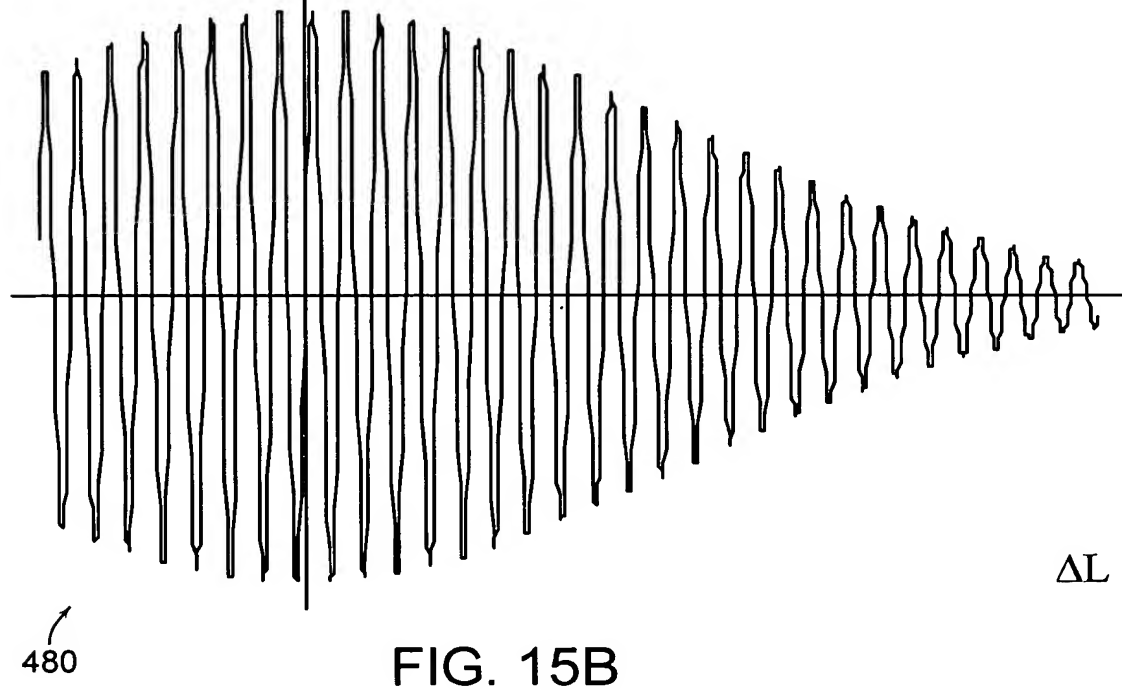
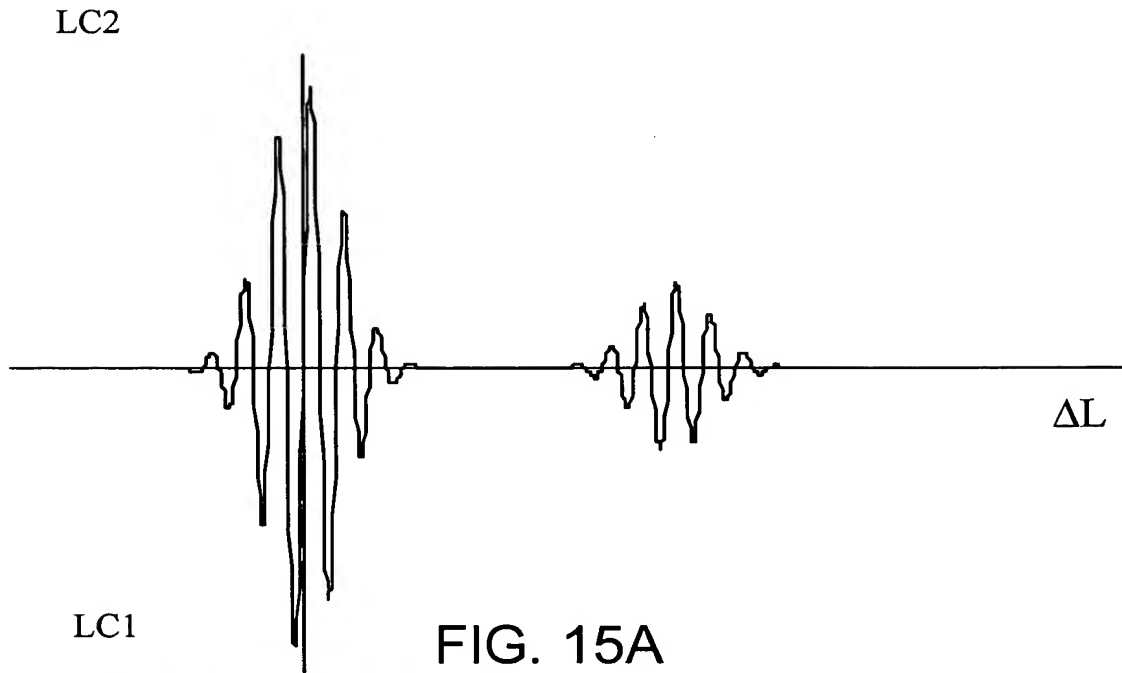
16/74





17/74

470  
↙



18/74

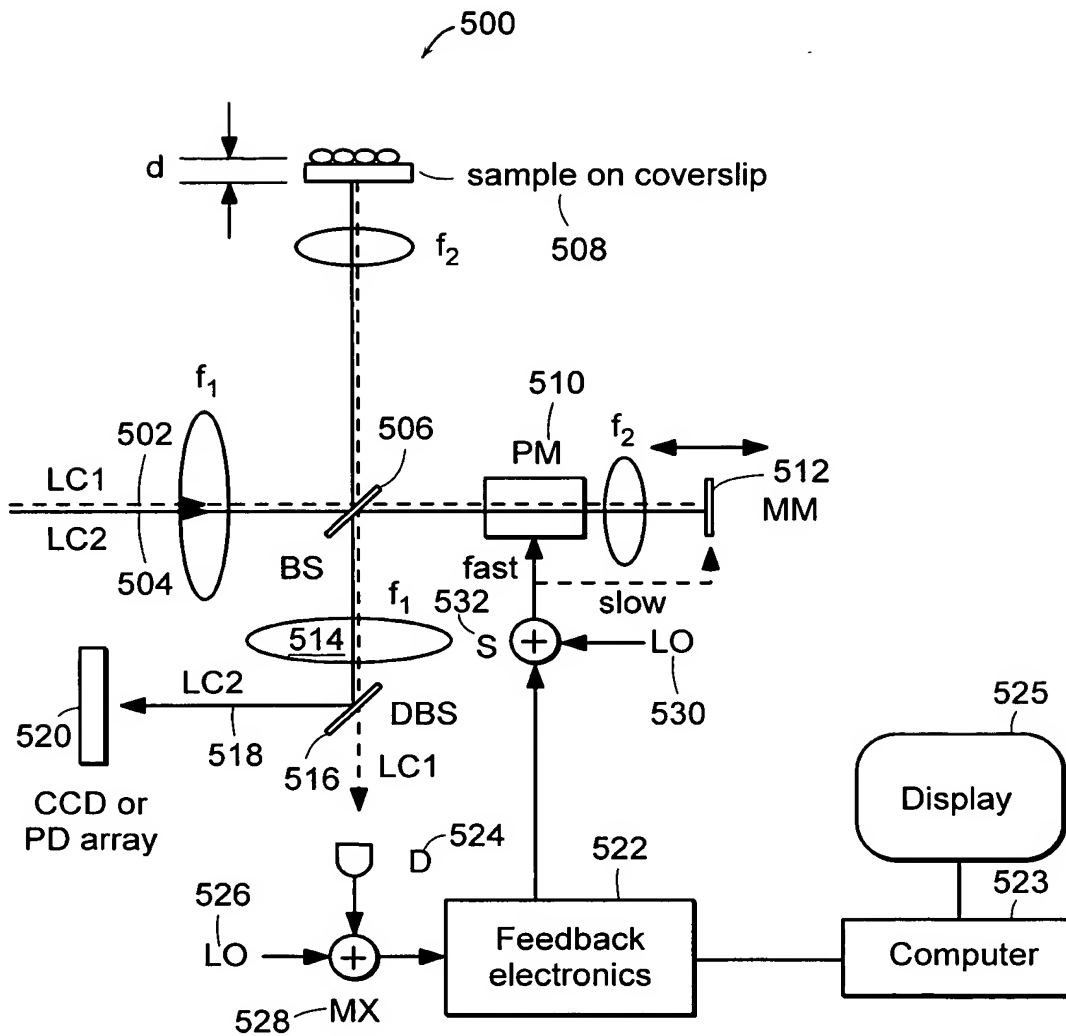


FIG. 16

19/74

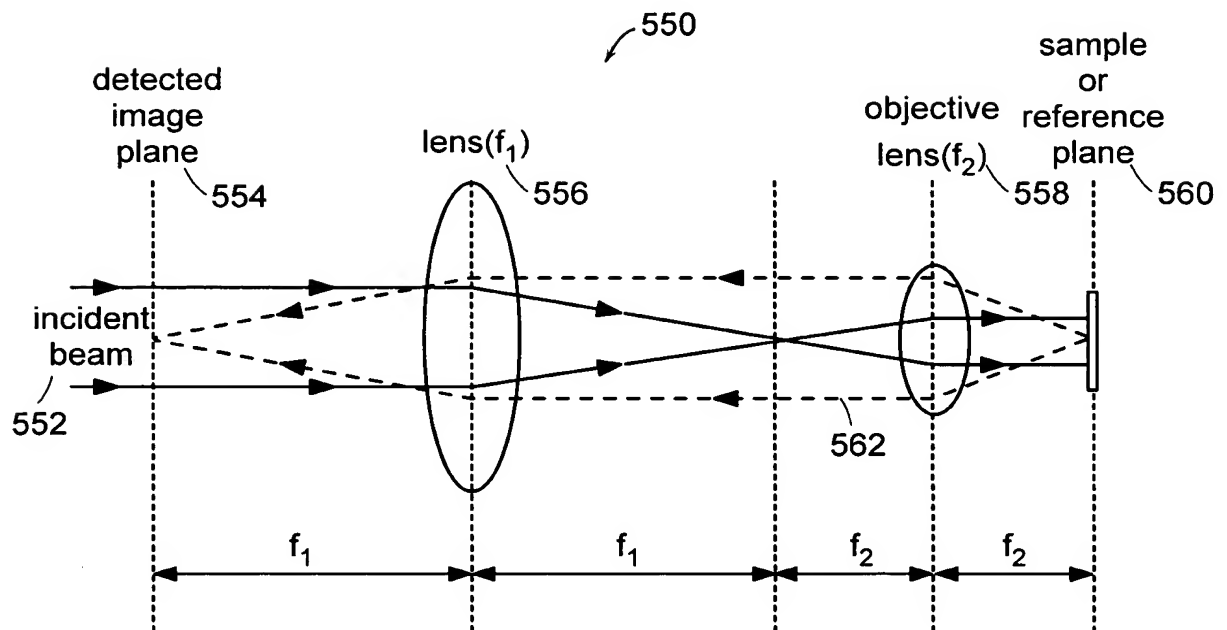


FIG. 17

20/74

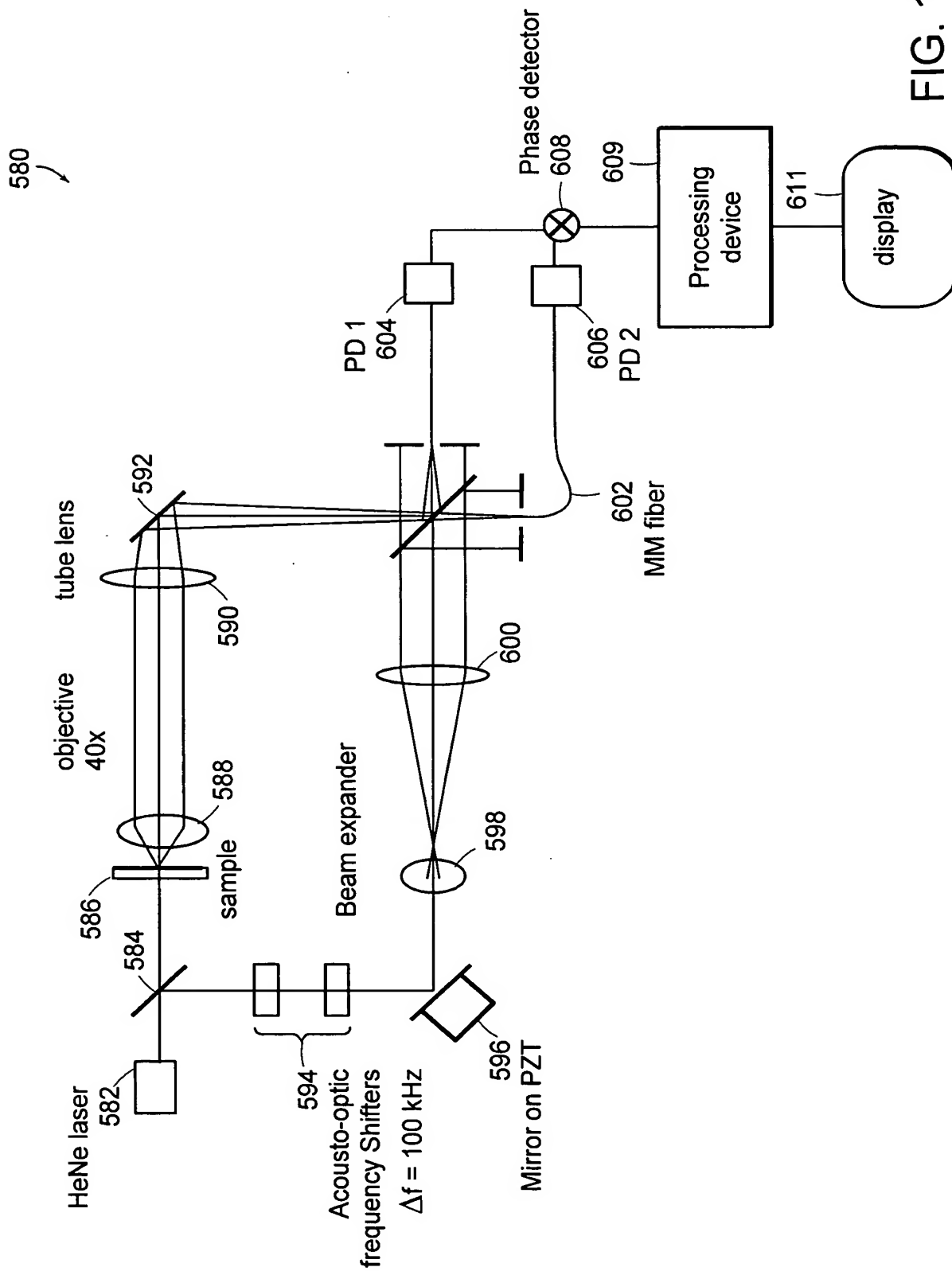


FIG. 18A

21/74

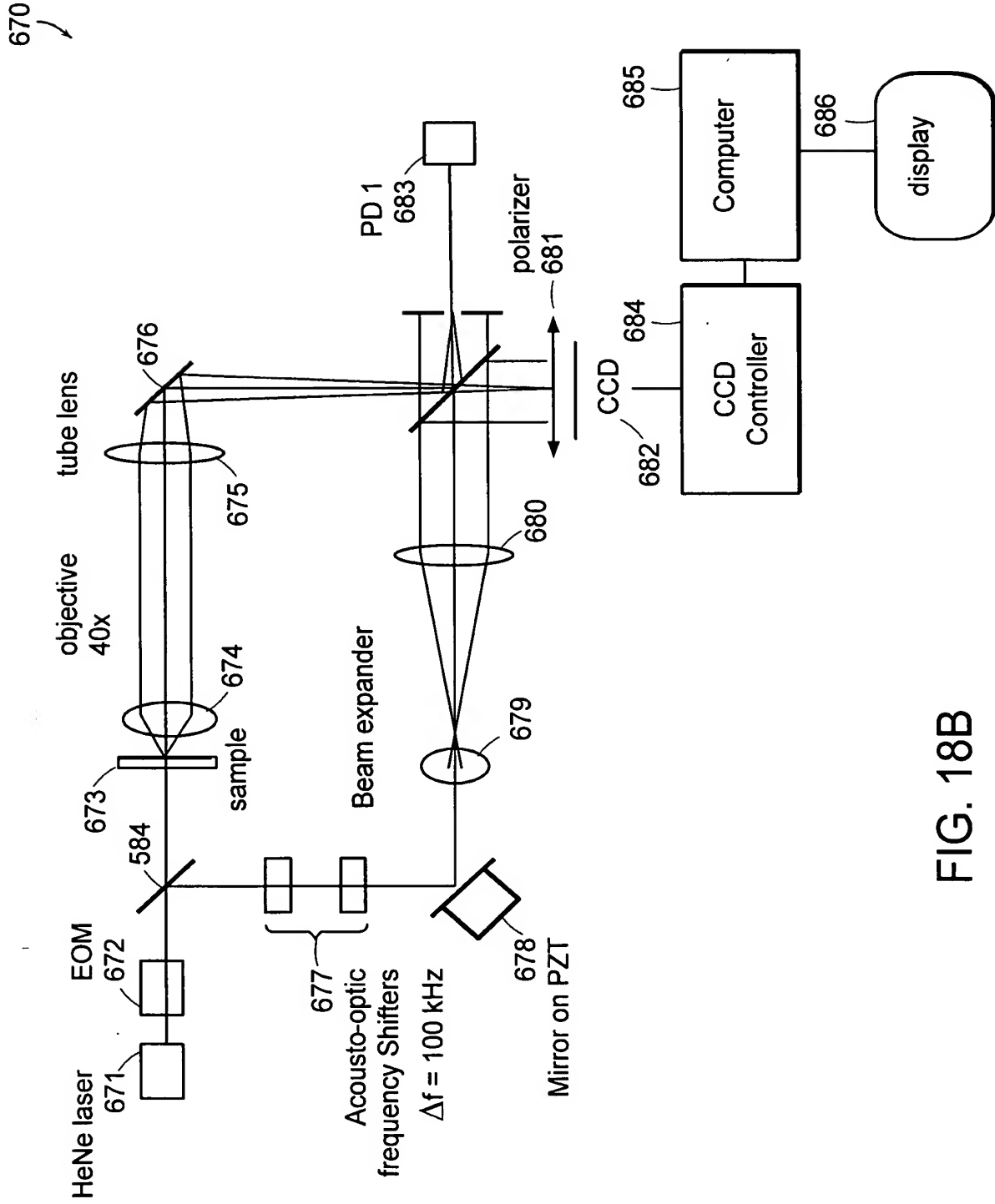


FIG. 18B

22/74

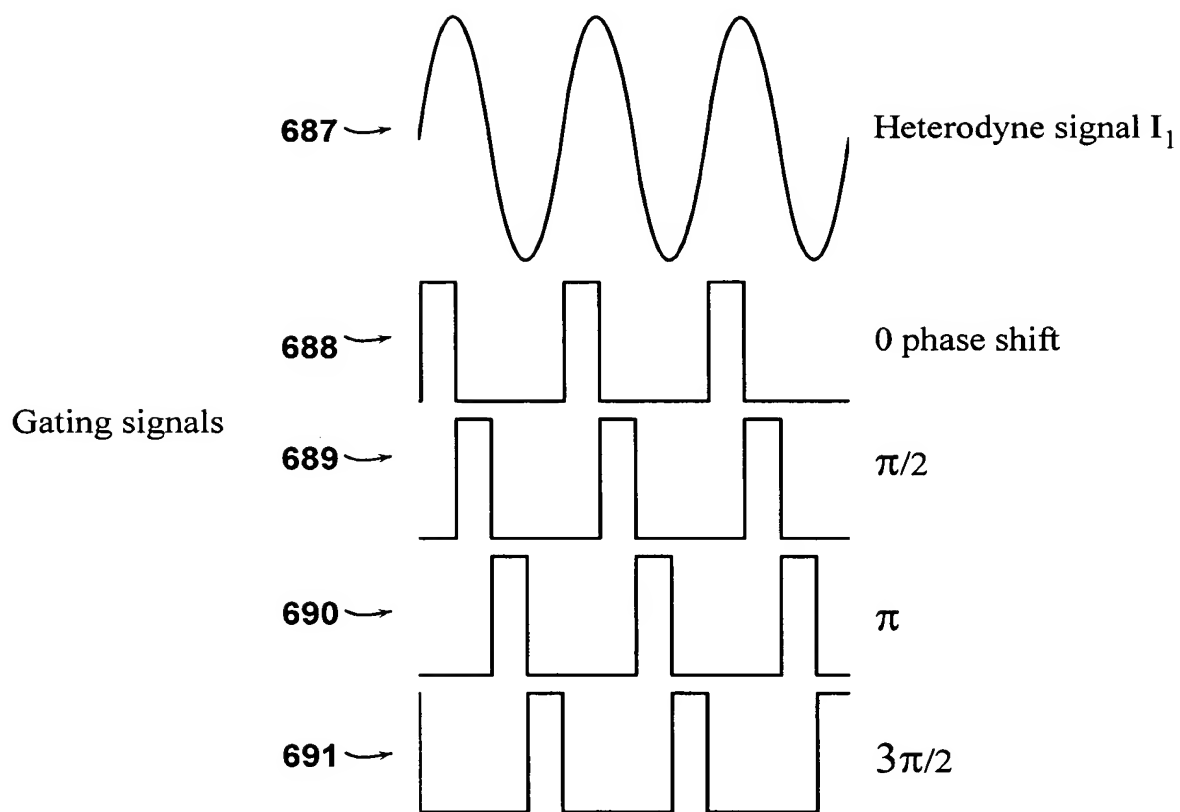


FIG. 18C

23/74

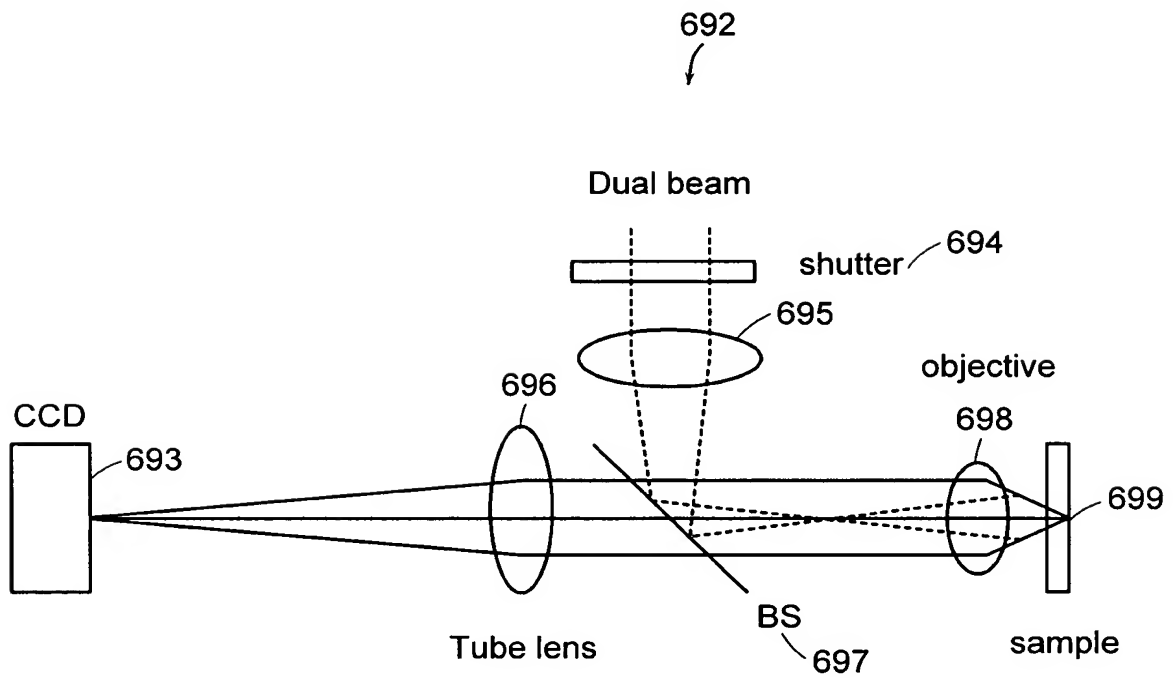


FIG. 18D

24/74

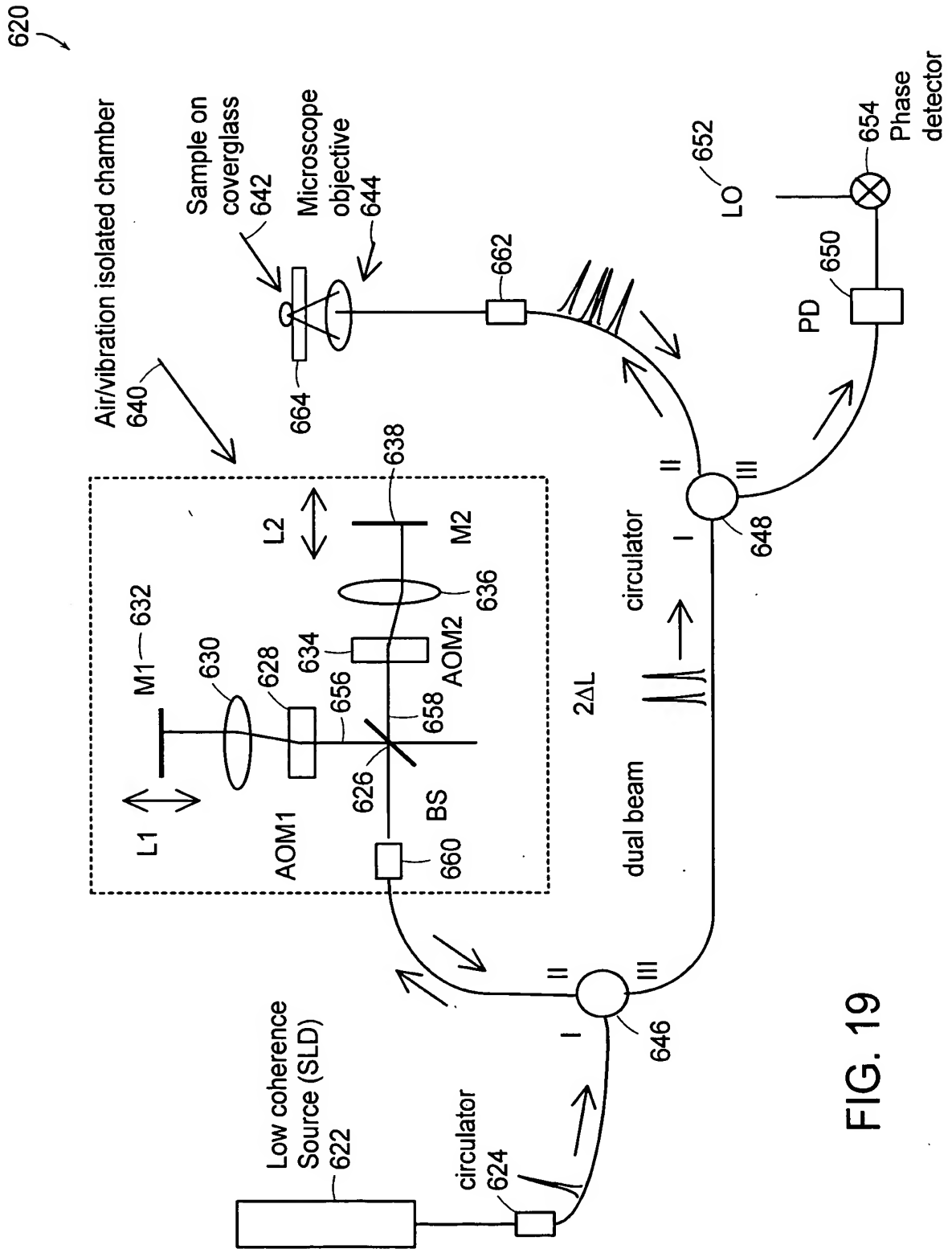


FIG. 19



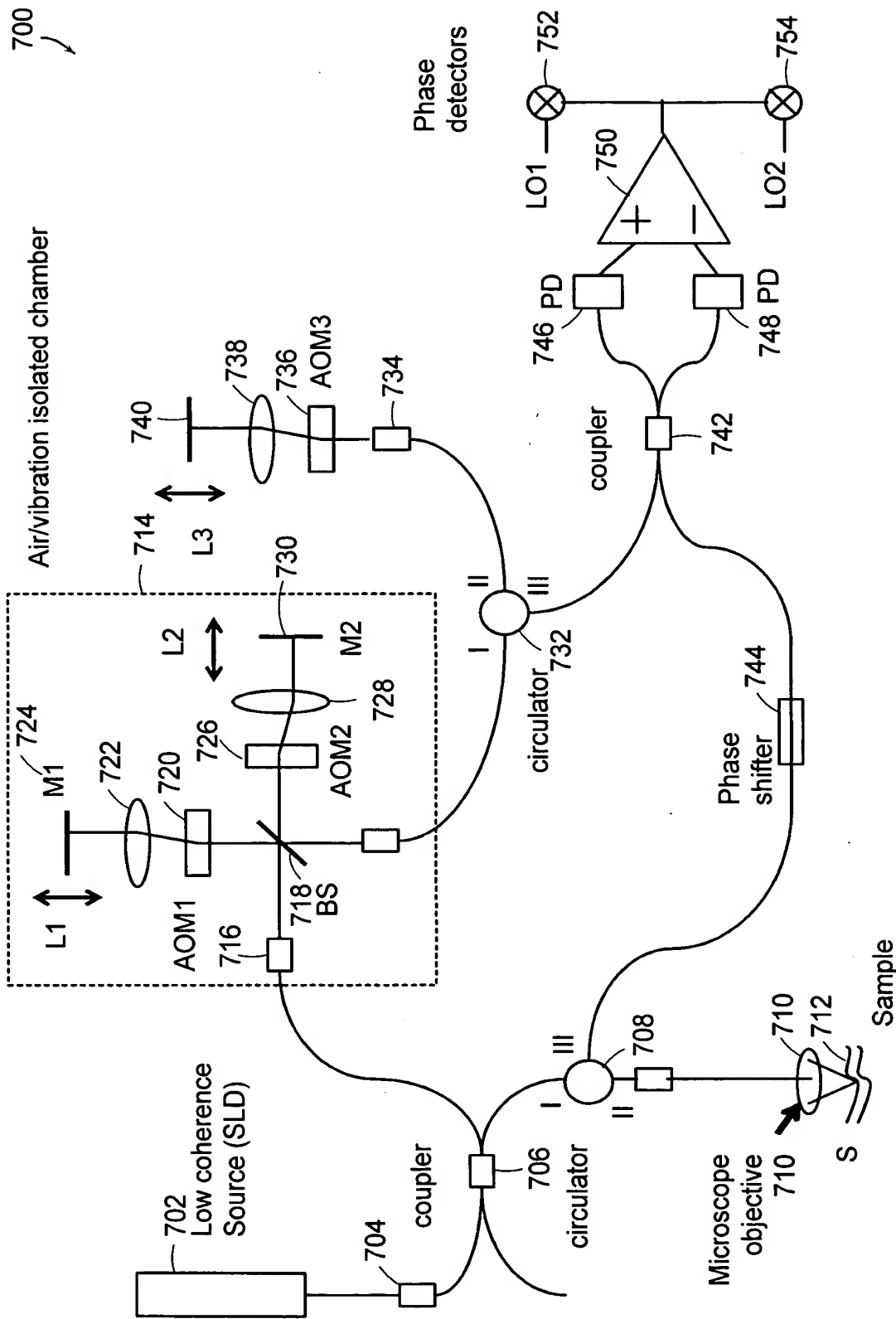


FIG. 20

26/74

760

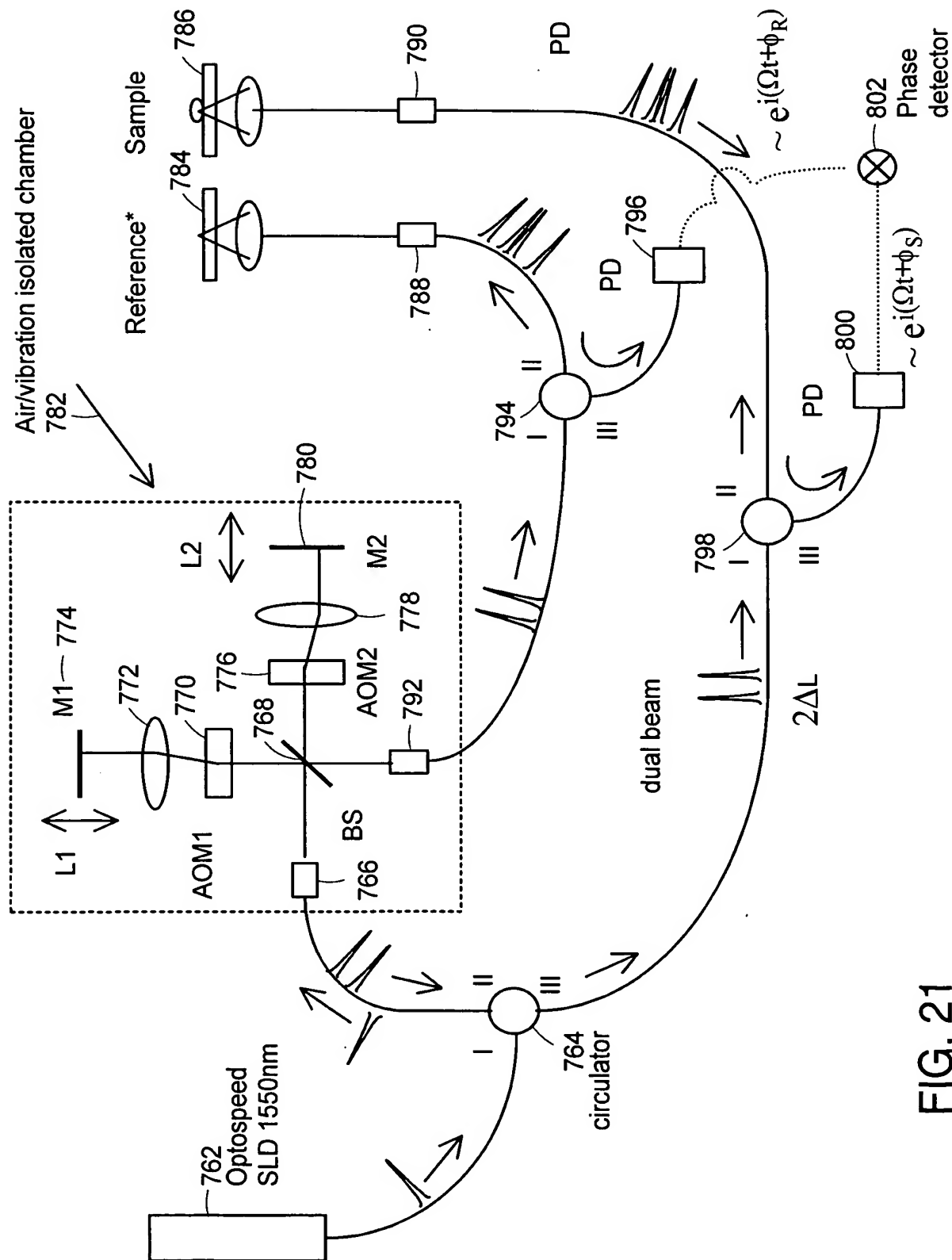


FIG. 21

27/74

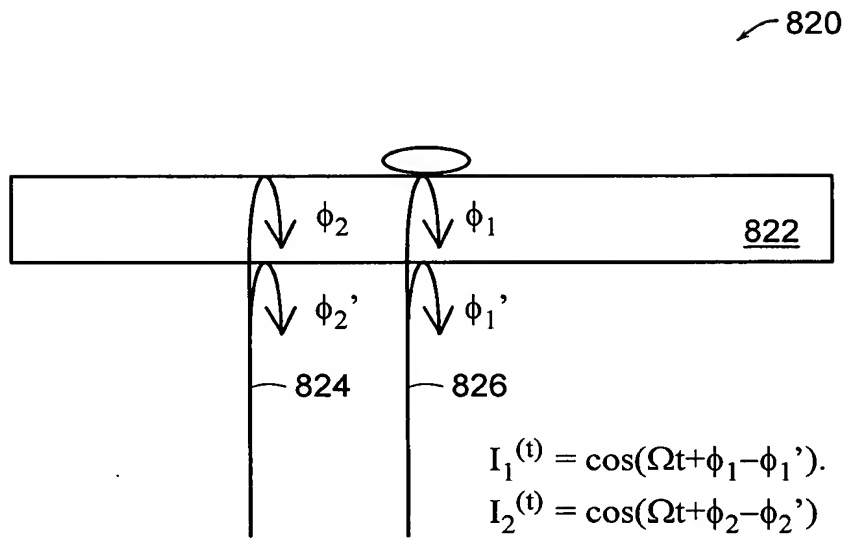


FIG. 22

28/74

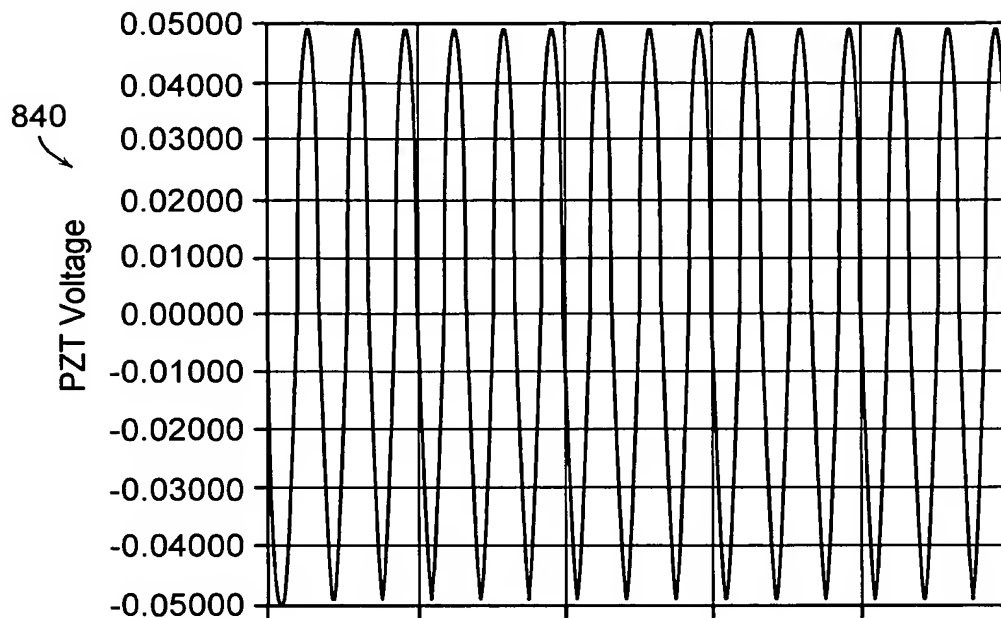


FIG. 23A

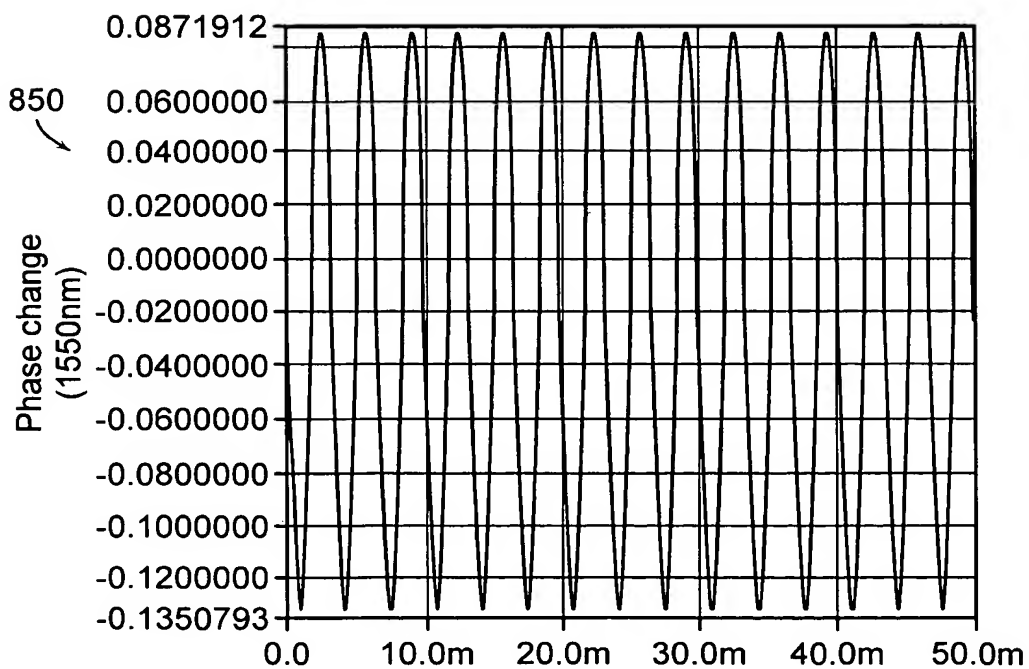


FIG. 23B

29/74

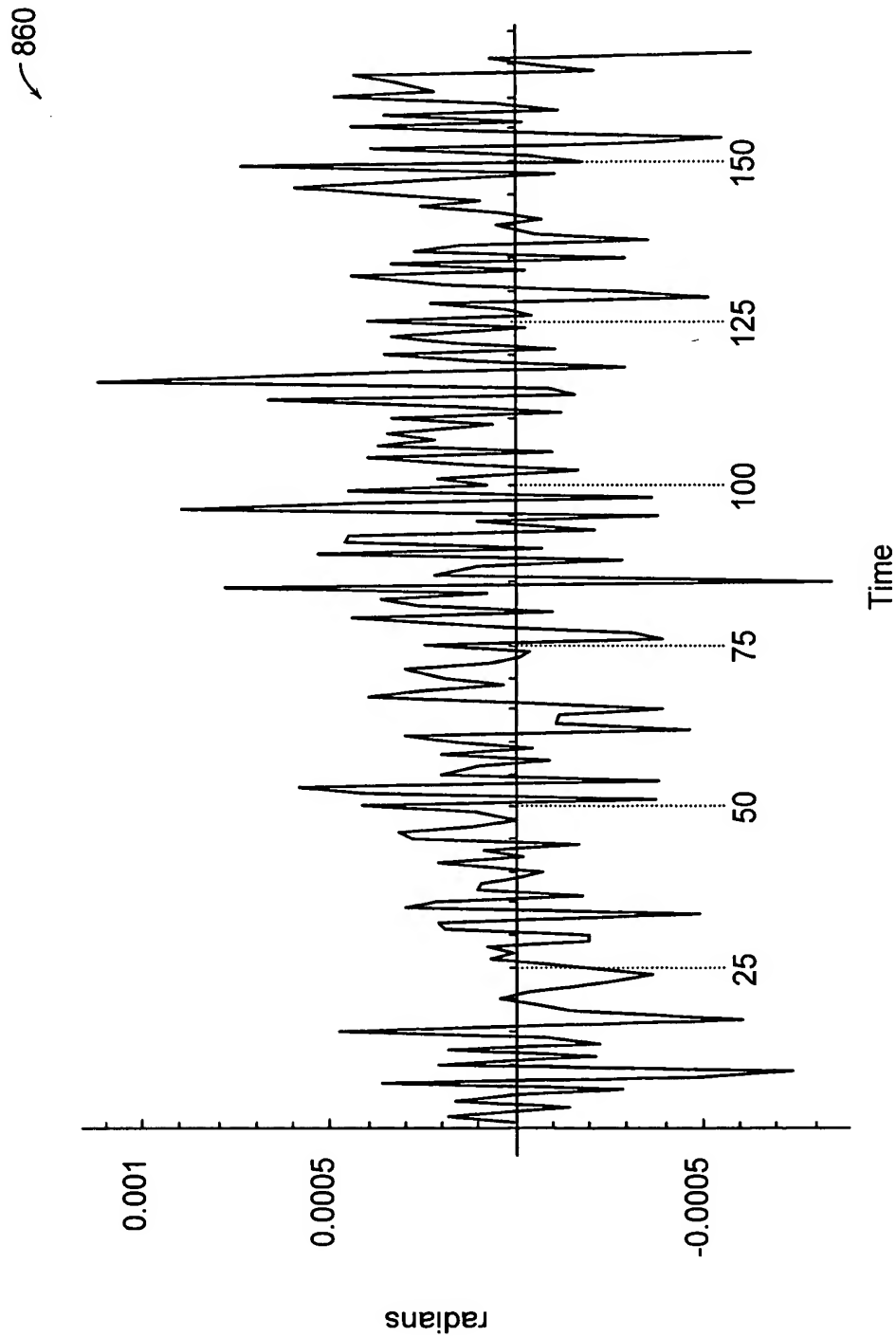


FIG. 24

30/74

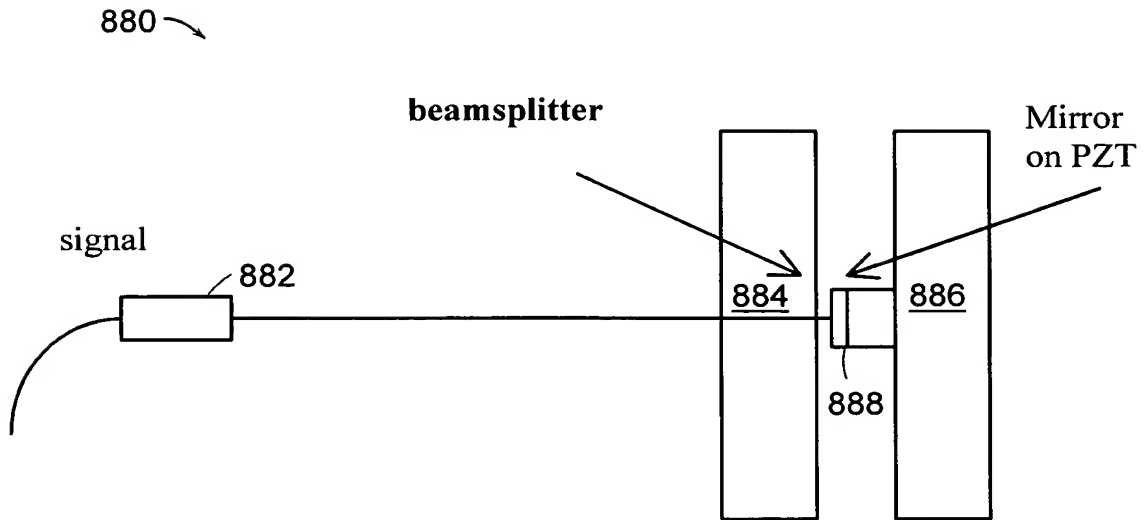


FIG. 25A



FIG. 25B

31/74

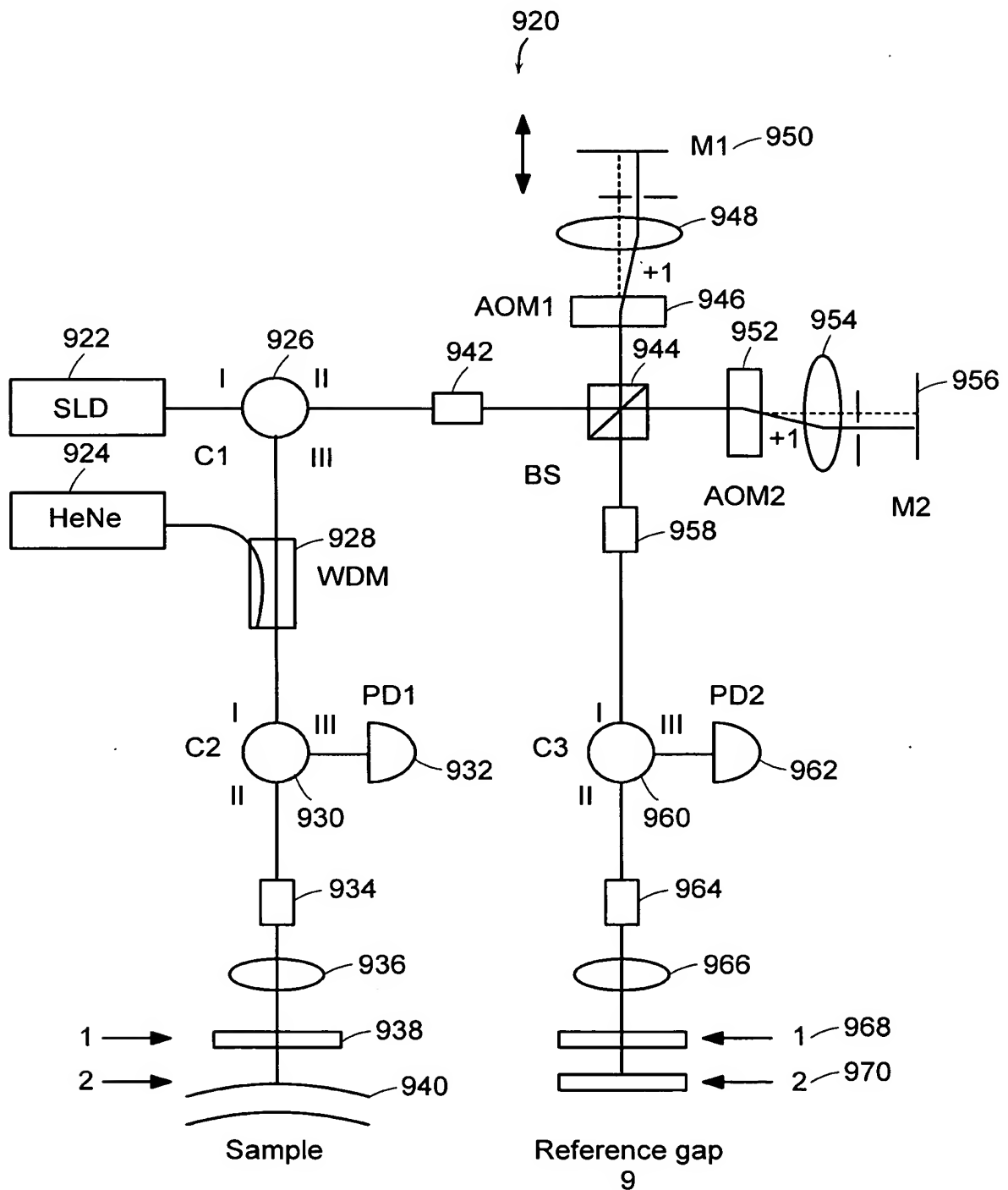


FIG. 26

32/74

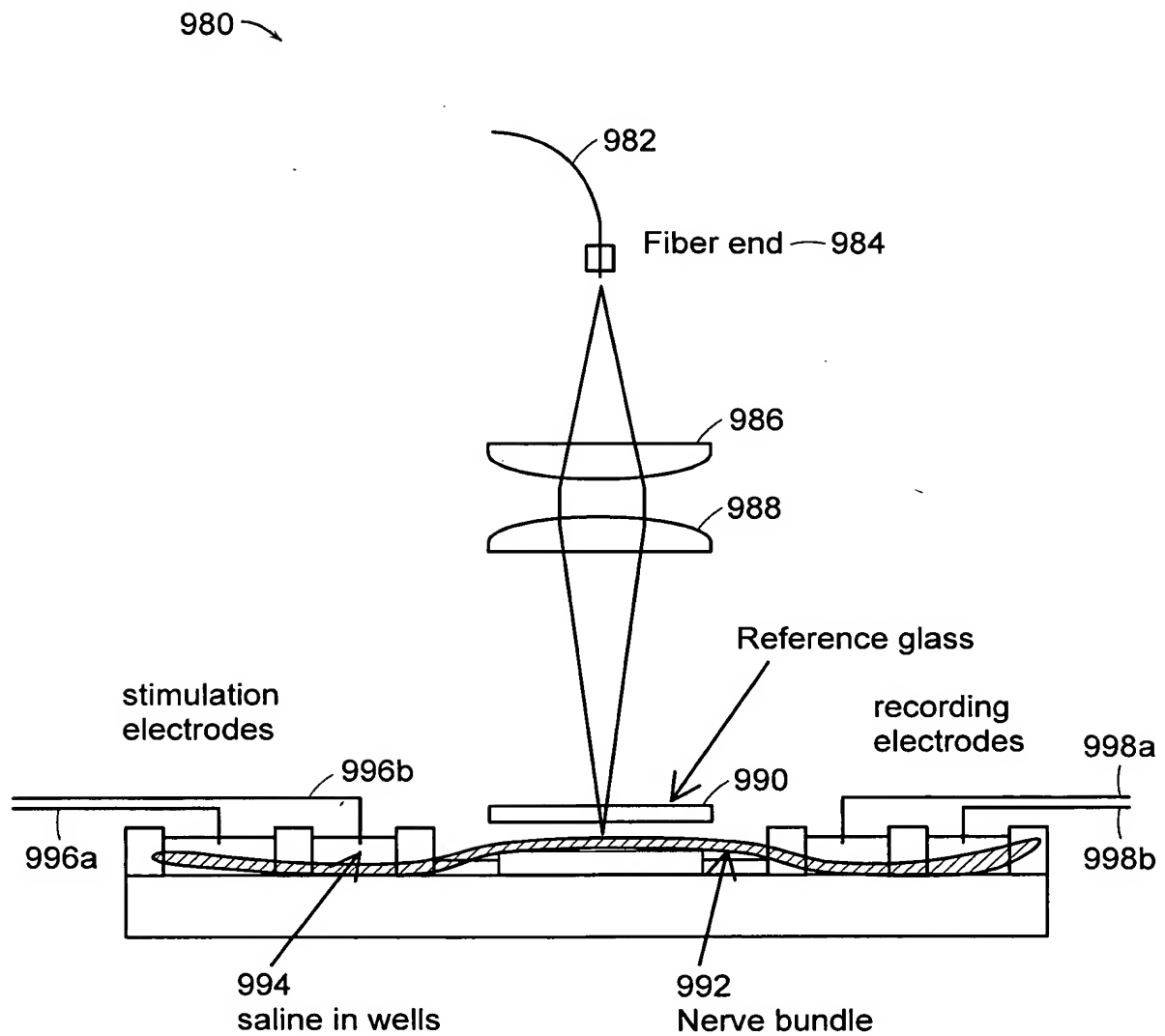


FIG. 27



33/74

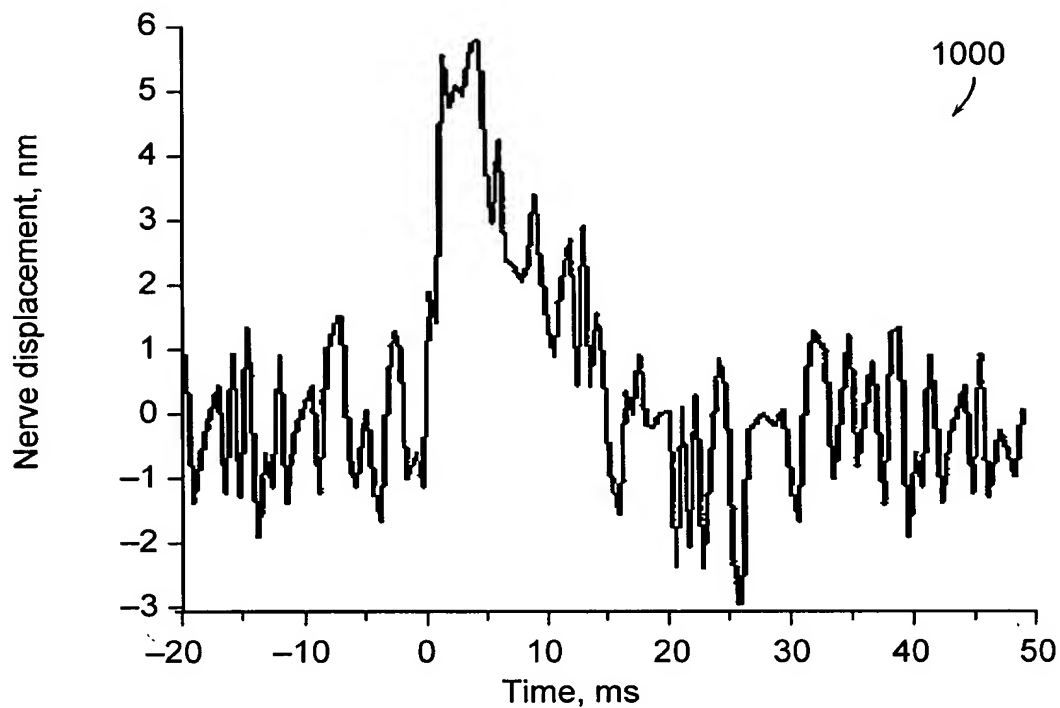


FIG. 28A

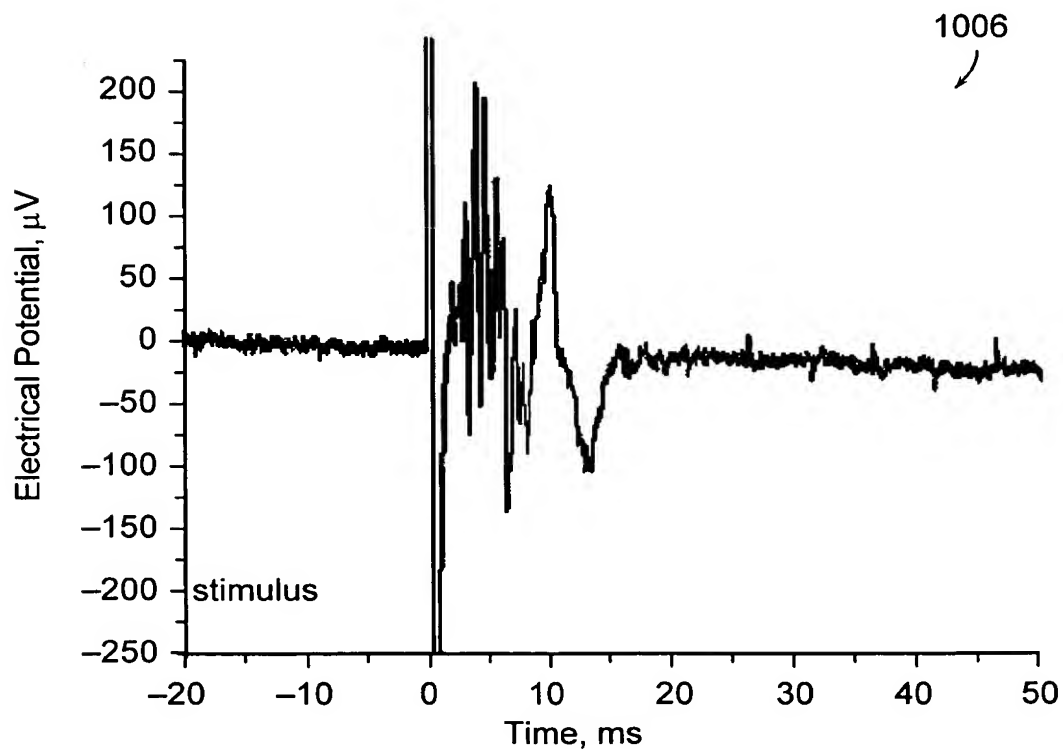


FIG. 28B

34/74

1010

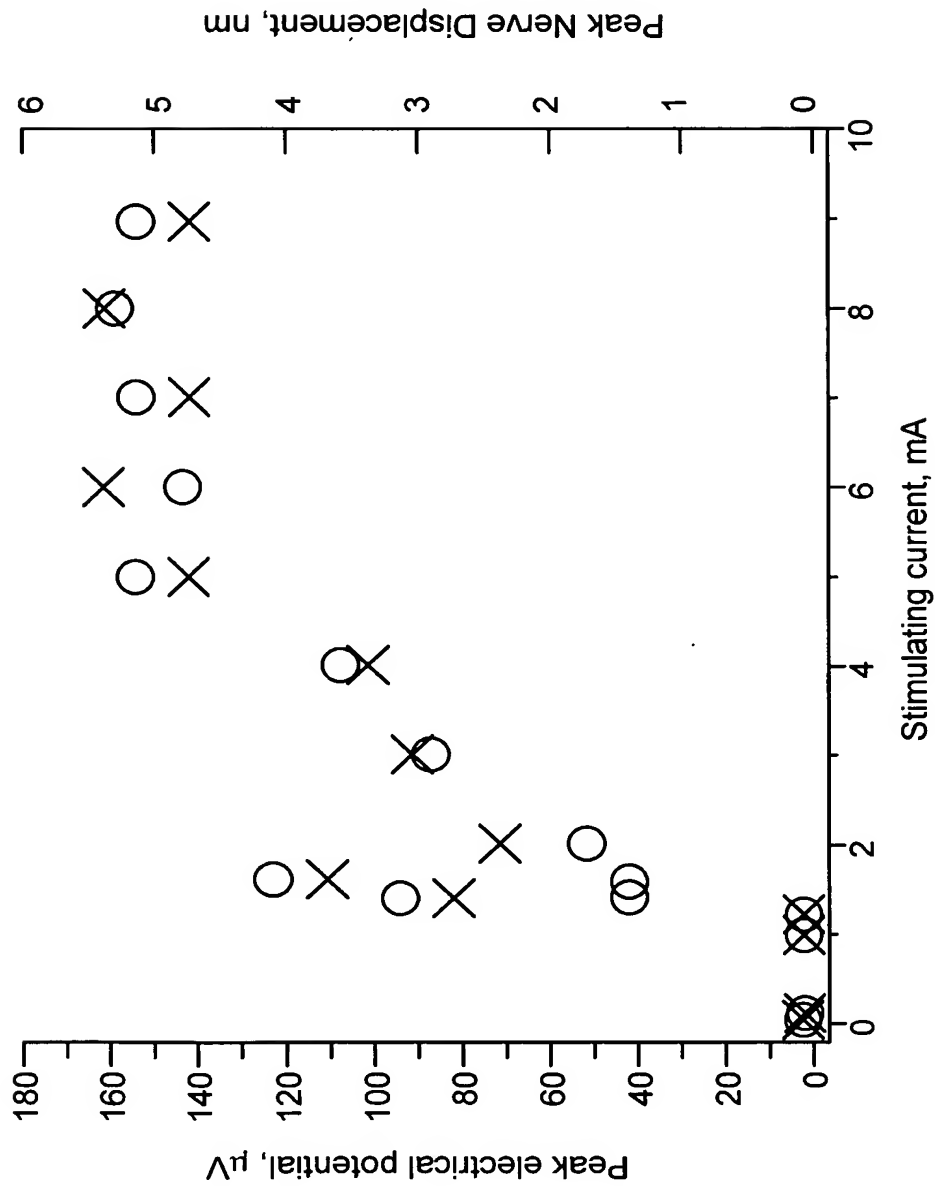


FIG. 29

35/74

1020

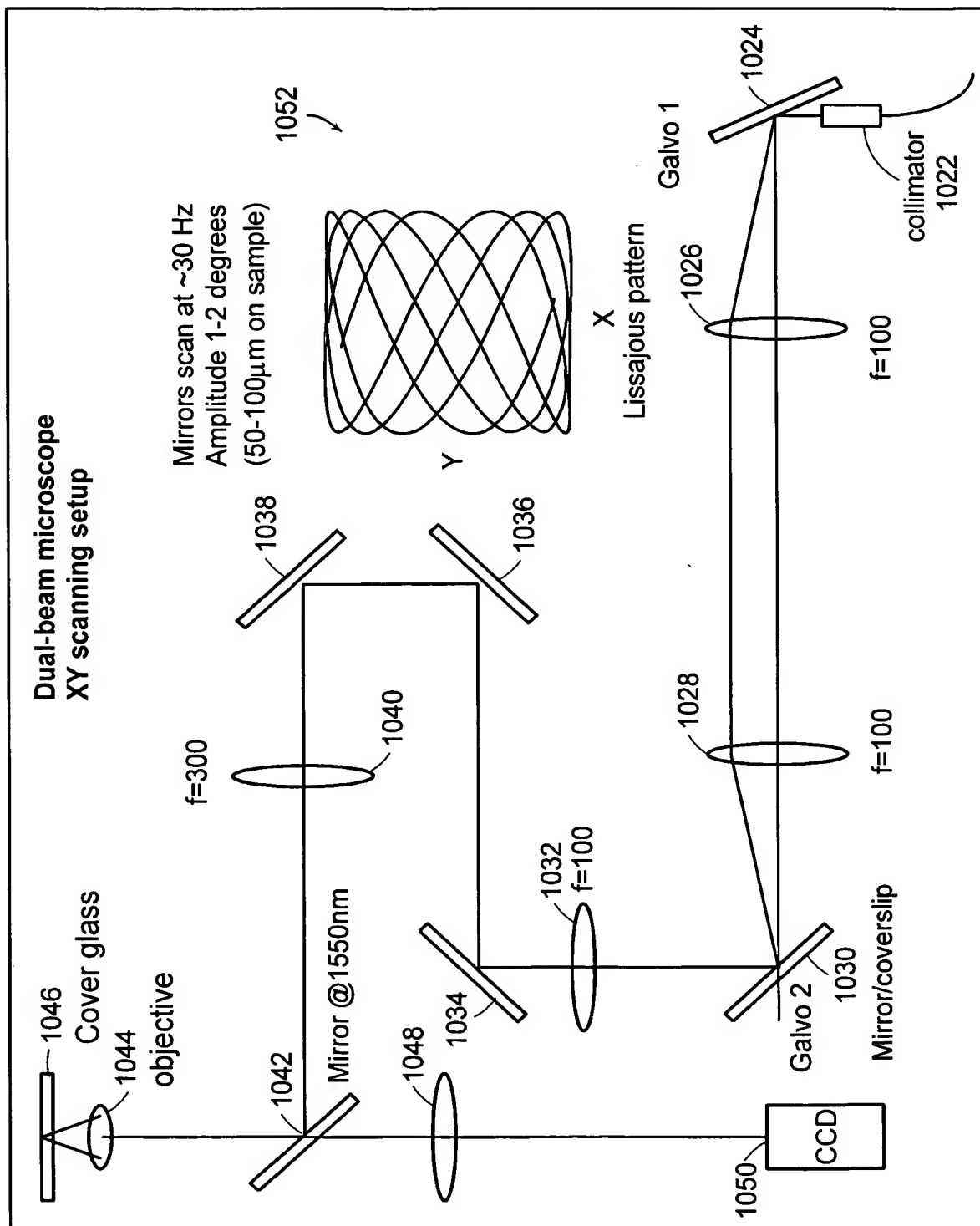


FIG. 30

36/74

1070

Beam scanning data from a blank coverglass. Noise ~25 mrad over 1kHz

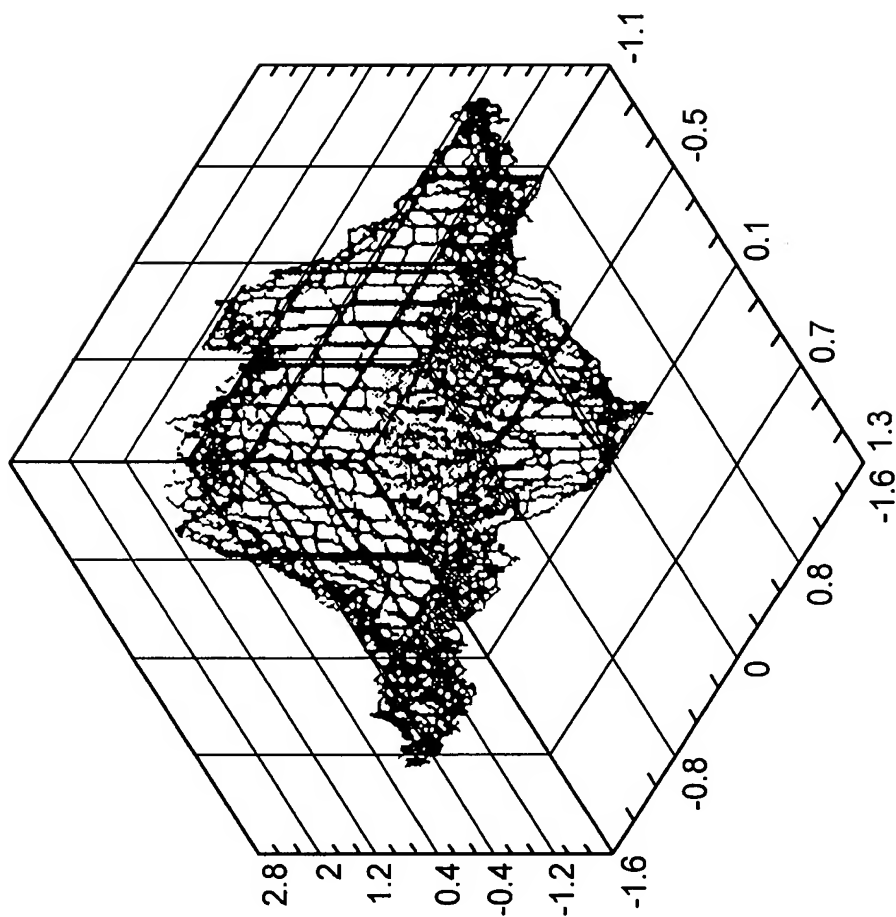


FIG. 31

37/74

Beam scanning data from a blank coverglass. Noise ~25 mrad over 1kHz

1080

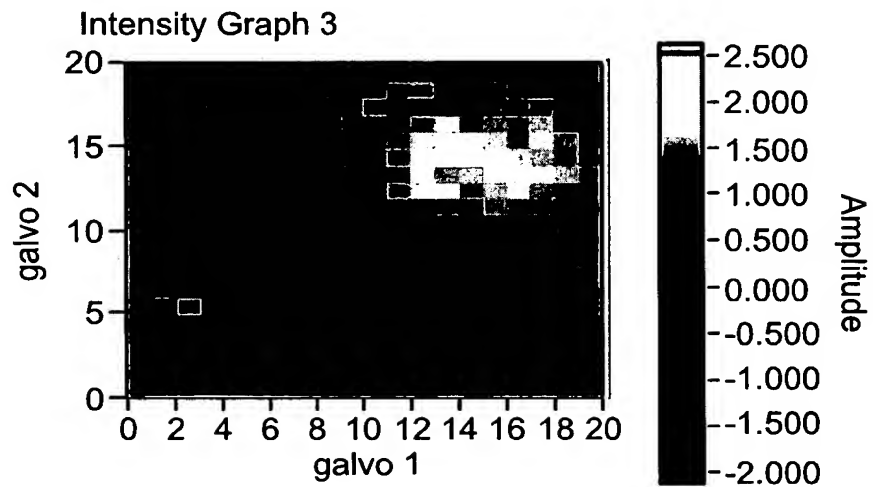


FIG. 32A

1090

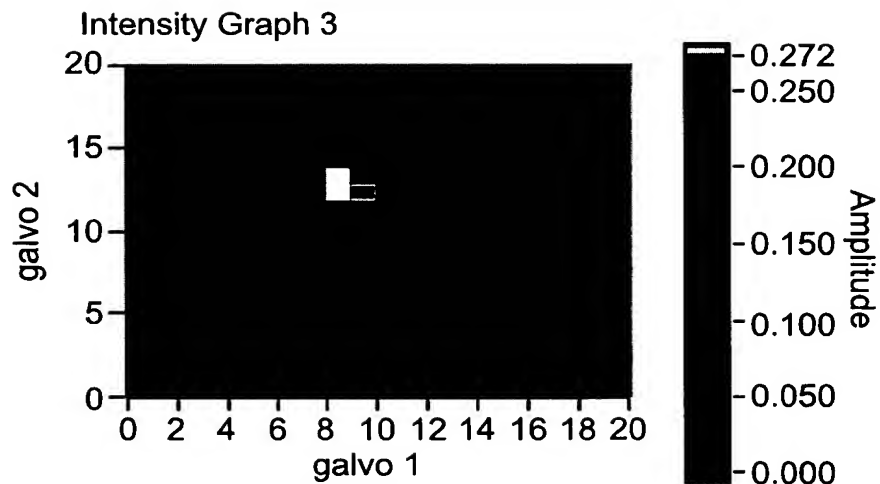


FIG. 32B

38/74

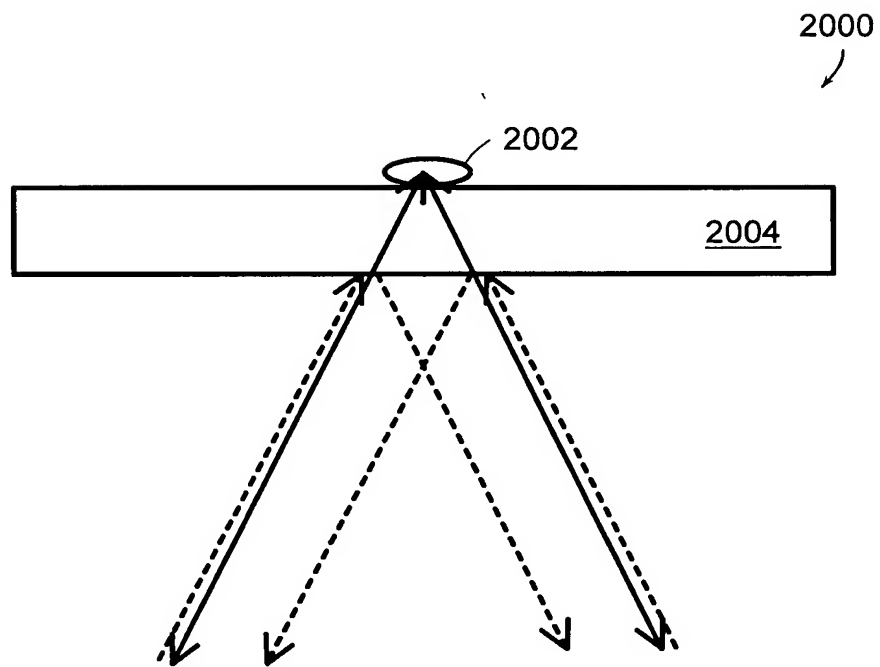


FIG. 33

39/74

2020

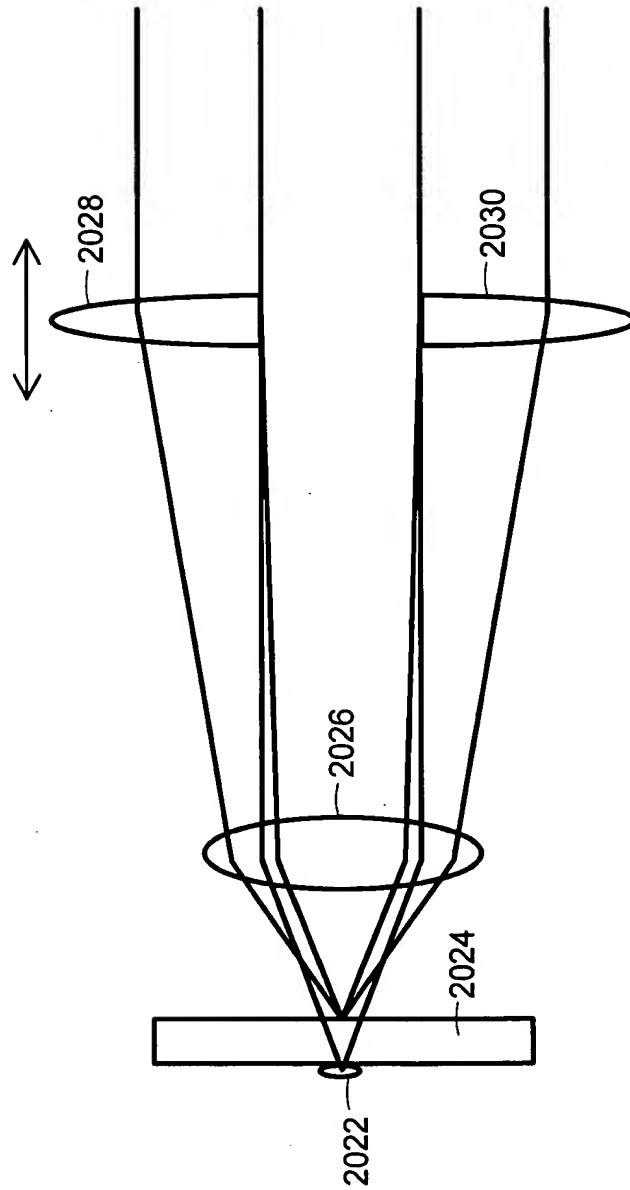


FIG. 34

40/74

2050  
↙

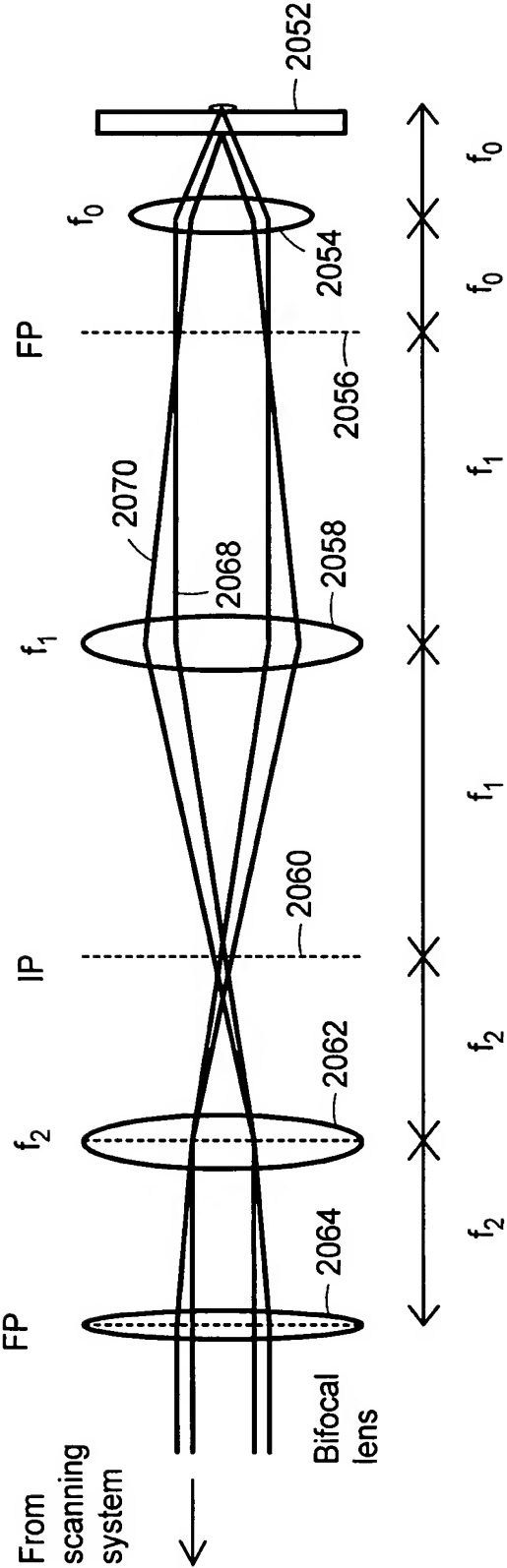


FIG. 35



2080

# Optical design by ray tracing

```

= f0 = 6.4;
f1 = 300;
f2 = 100;
f3 = 50;
delta = .1;

x0 = f0;
x1 = 2 f0 + f1;
x2 = 2 f0 + 2 f1 + f2;
x3 = 2 f0 + 2 f1 + f2;

na = 0.4;

(* TRANSFER AND LENS MATRICES *)

t[z_] := {{1, z}, {0, 1}};
lens[f_] := {{1, 0}, {-1/f, 1}};

delta = .1;
soln =
Solve[
(t[z0 - delta] . lens[f0] . t[a1 - z0] .
lens[f1] . t[z2 - z1] . lens[f2] .
t[d3var] . lens[f3] .
{.6 wmax, 0}) [[1]] - 0, f3var]

Out[246]= {{d3var -> 104.489}}

```

41/74

Distance between f3 and f2 in order  
to shift focus by 100 microns

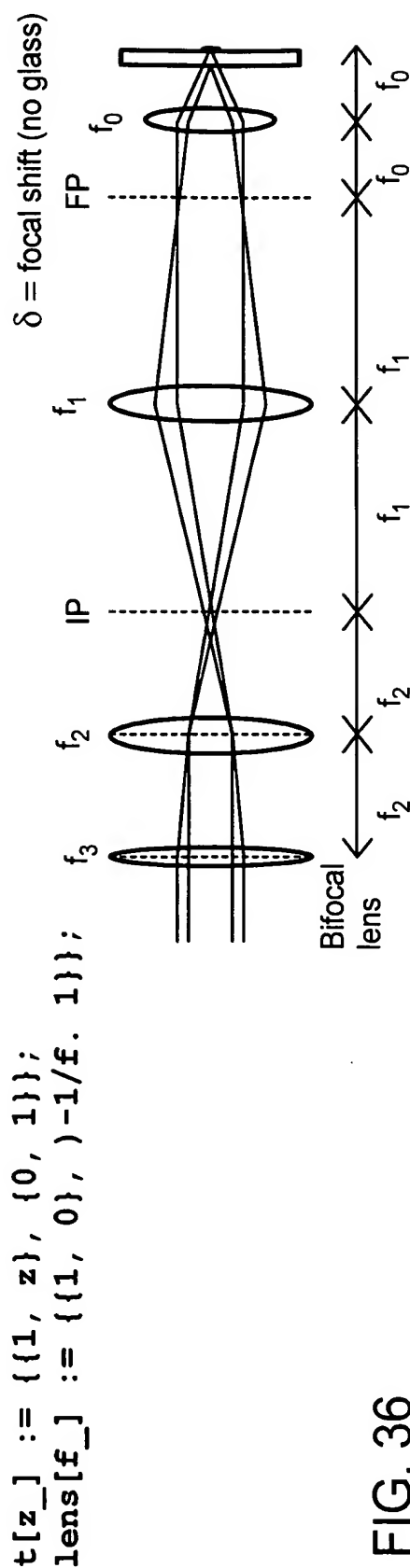


FIG. 36

42/74

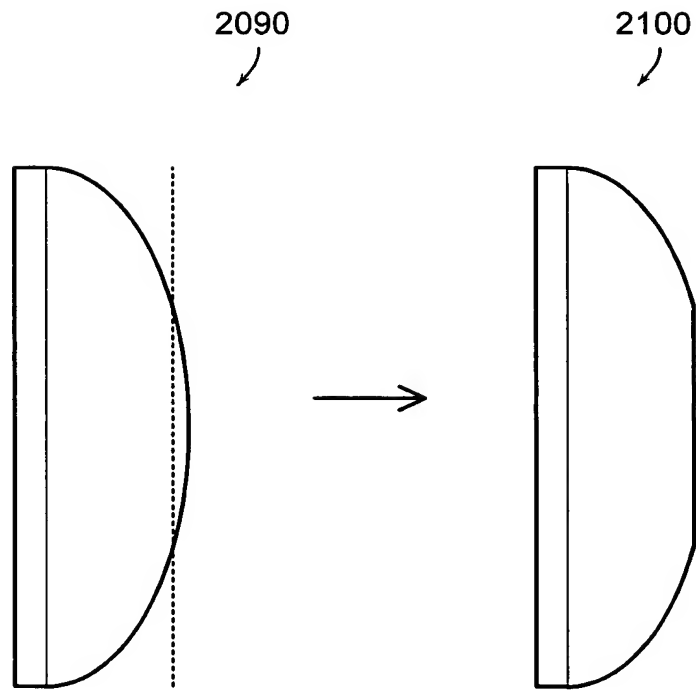
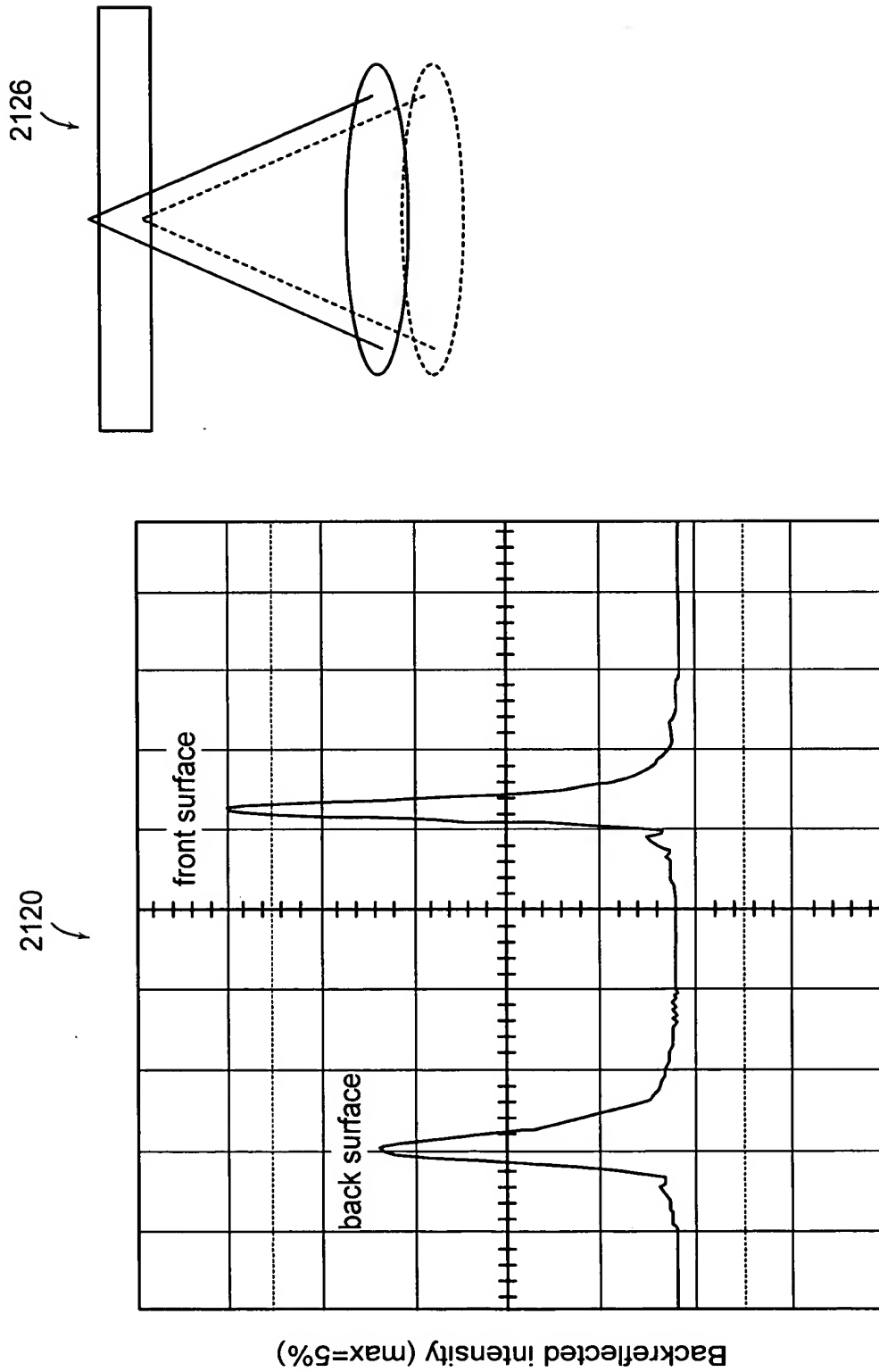
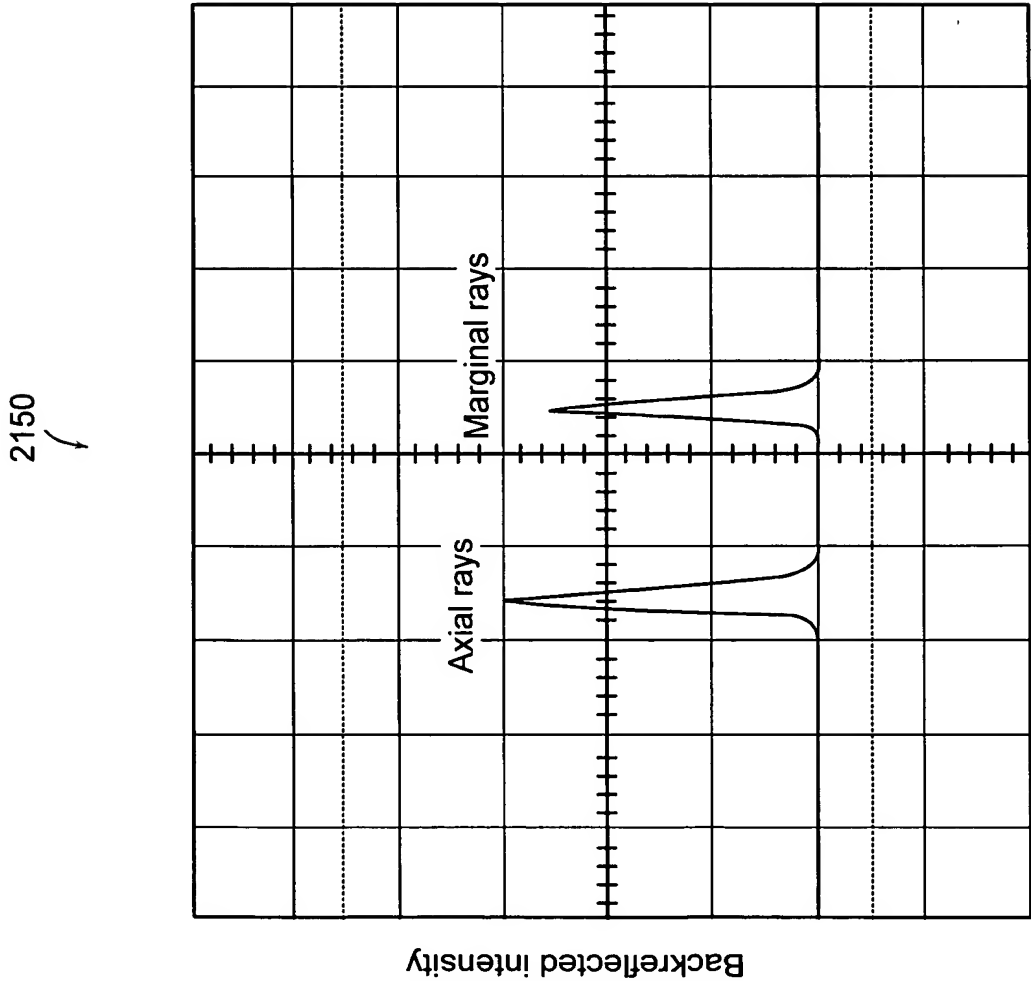
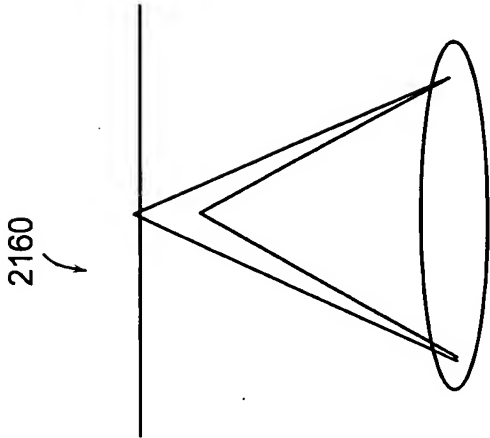


FIG. 37

43/74



Objective focus position  
 FIG. 38



Objective focus position

FIG. 39

45/74

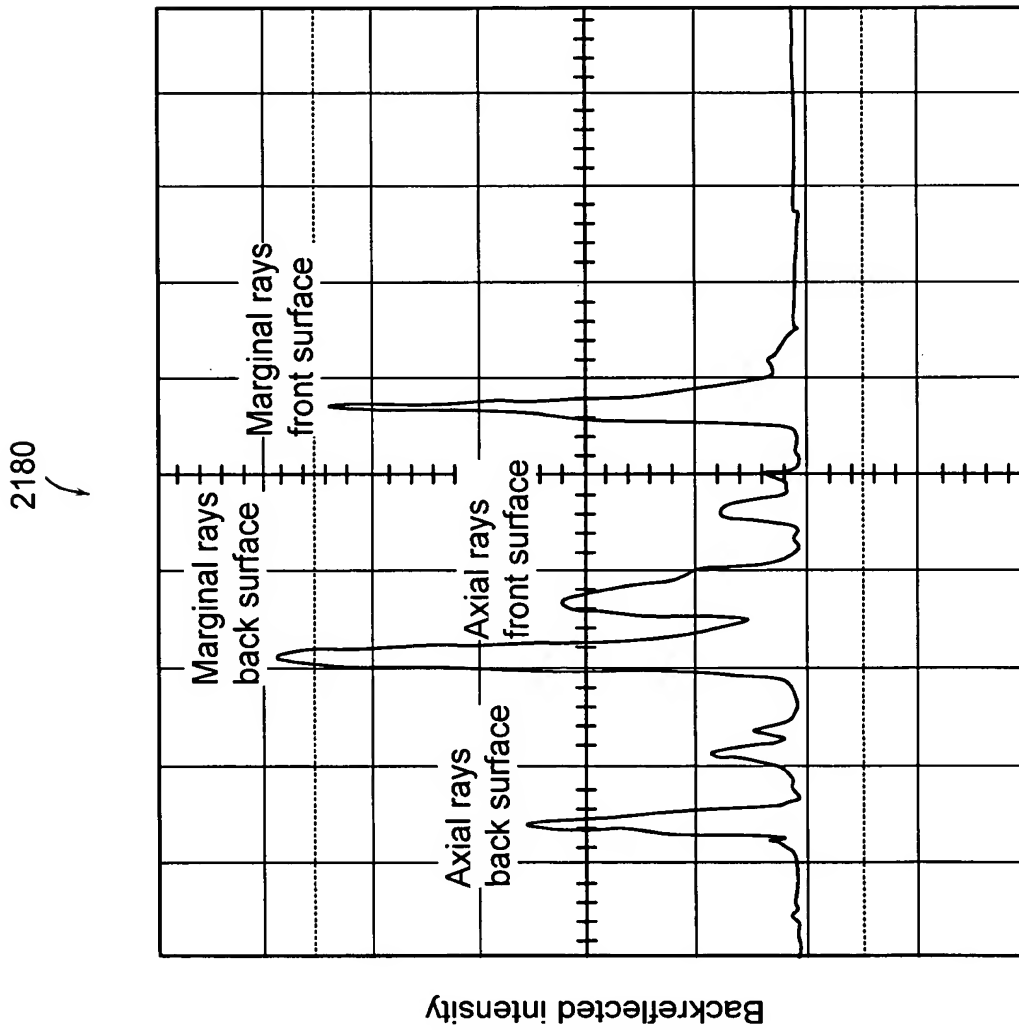
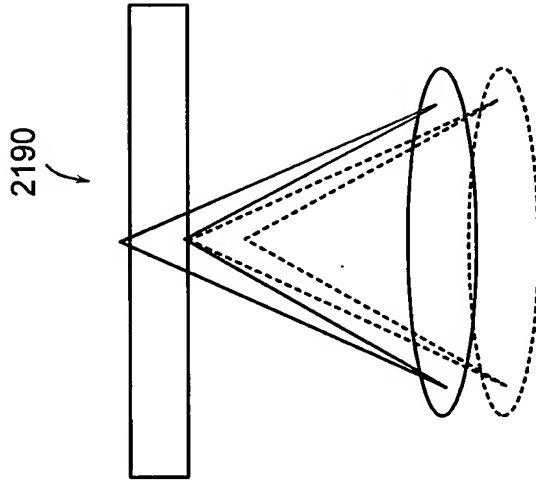


FIG. 40

46/74

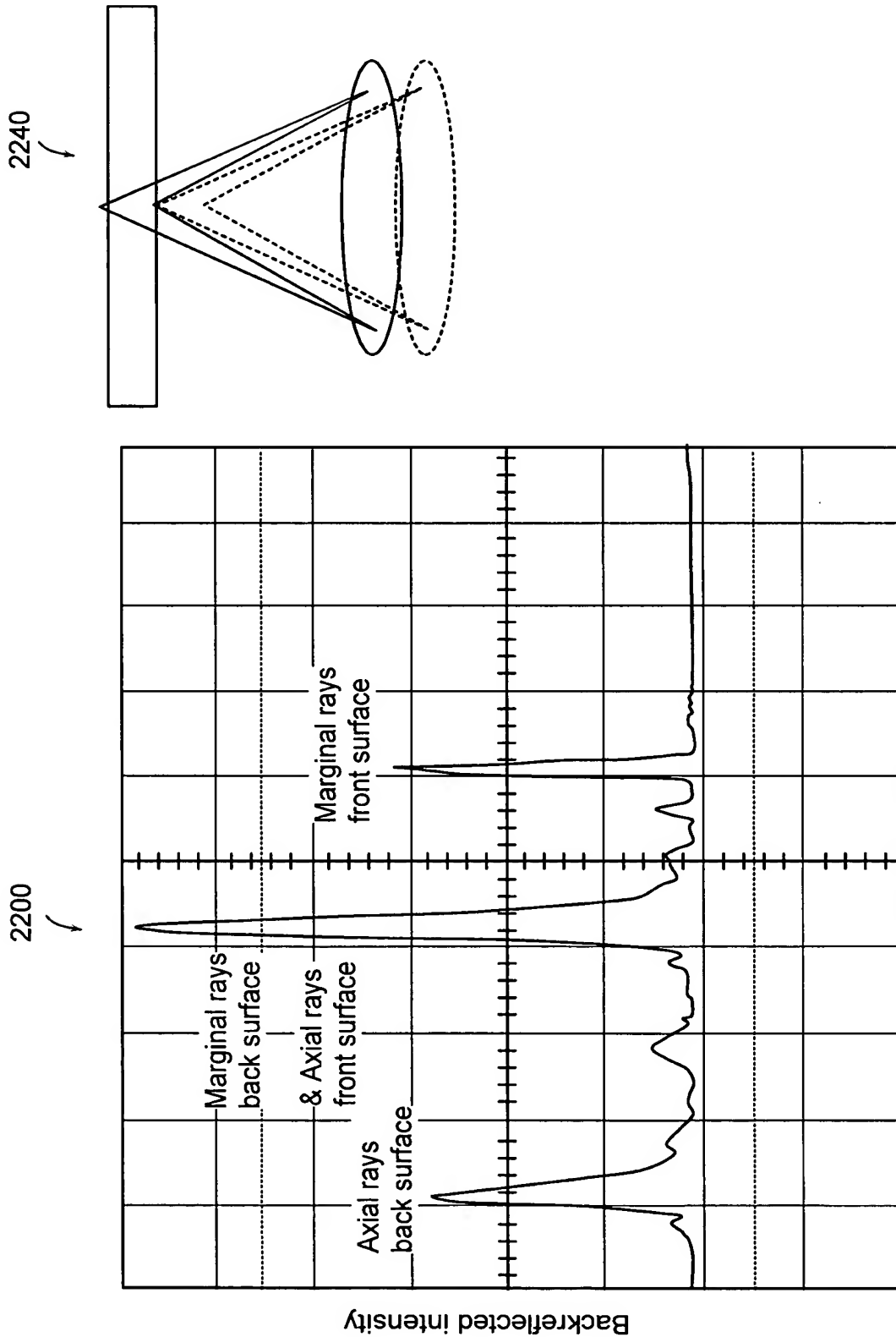
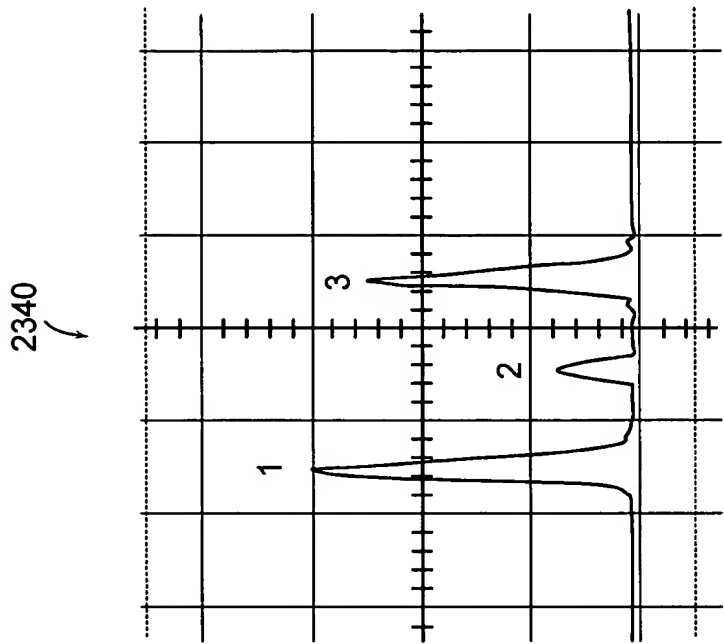
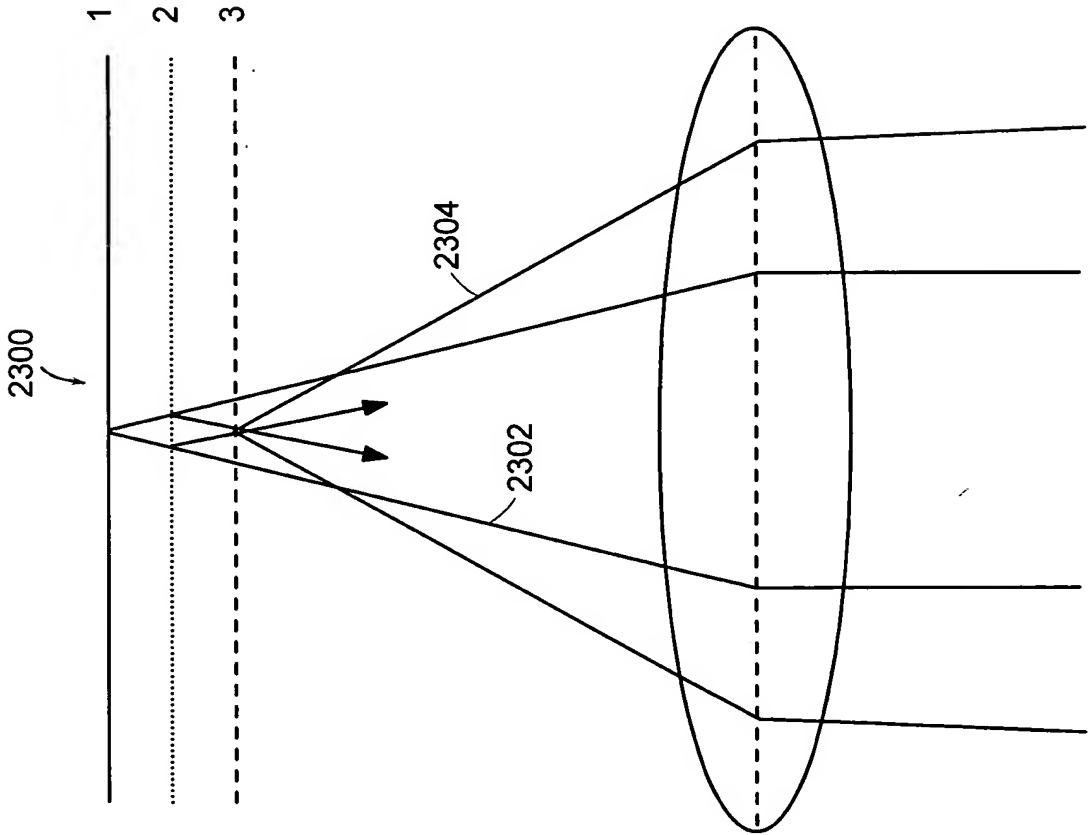


FIG. 41

Objective focus position

47/74



48/74

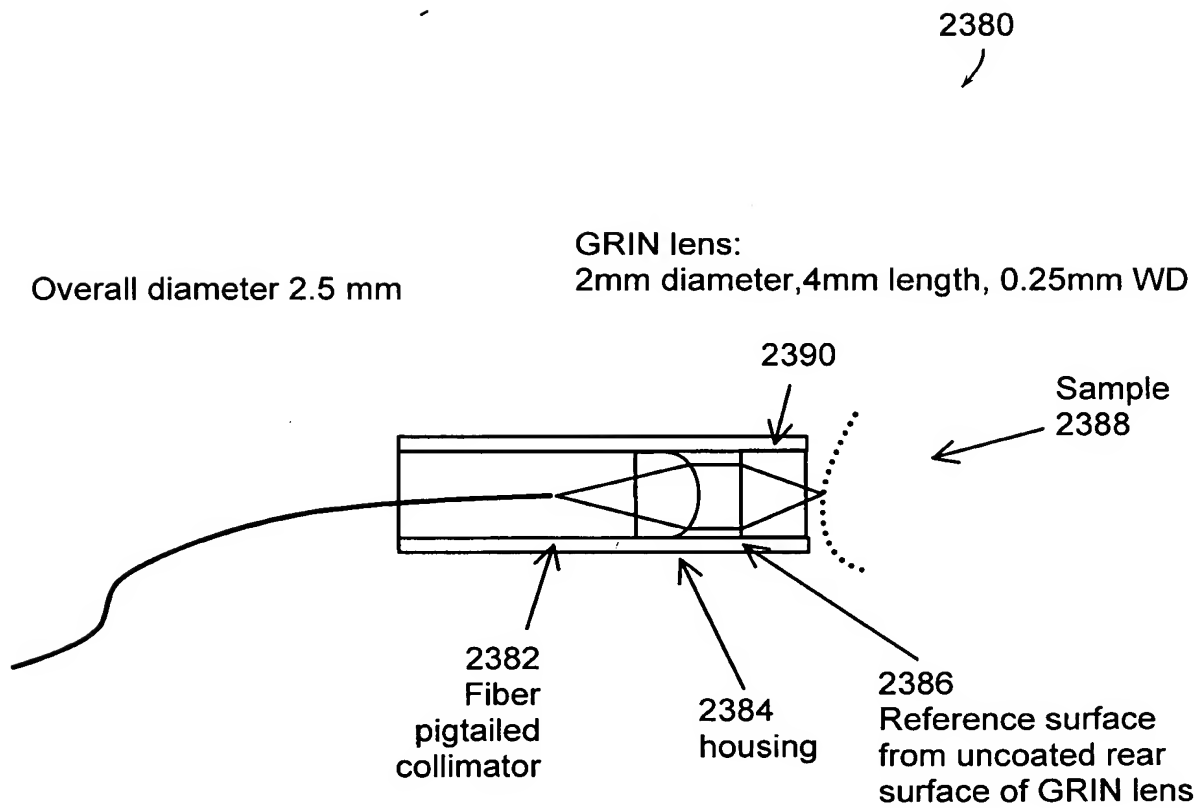


FIG. 43



49/74

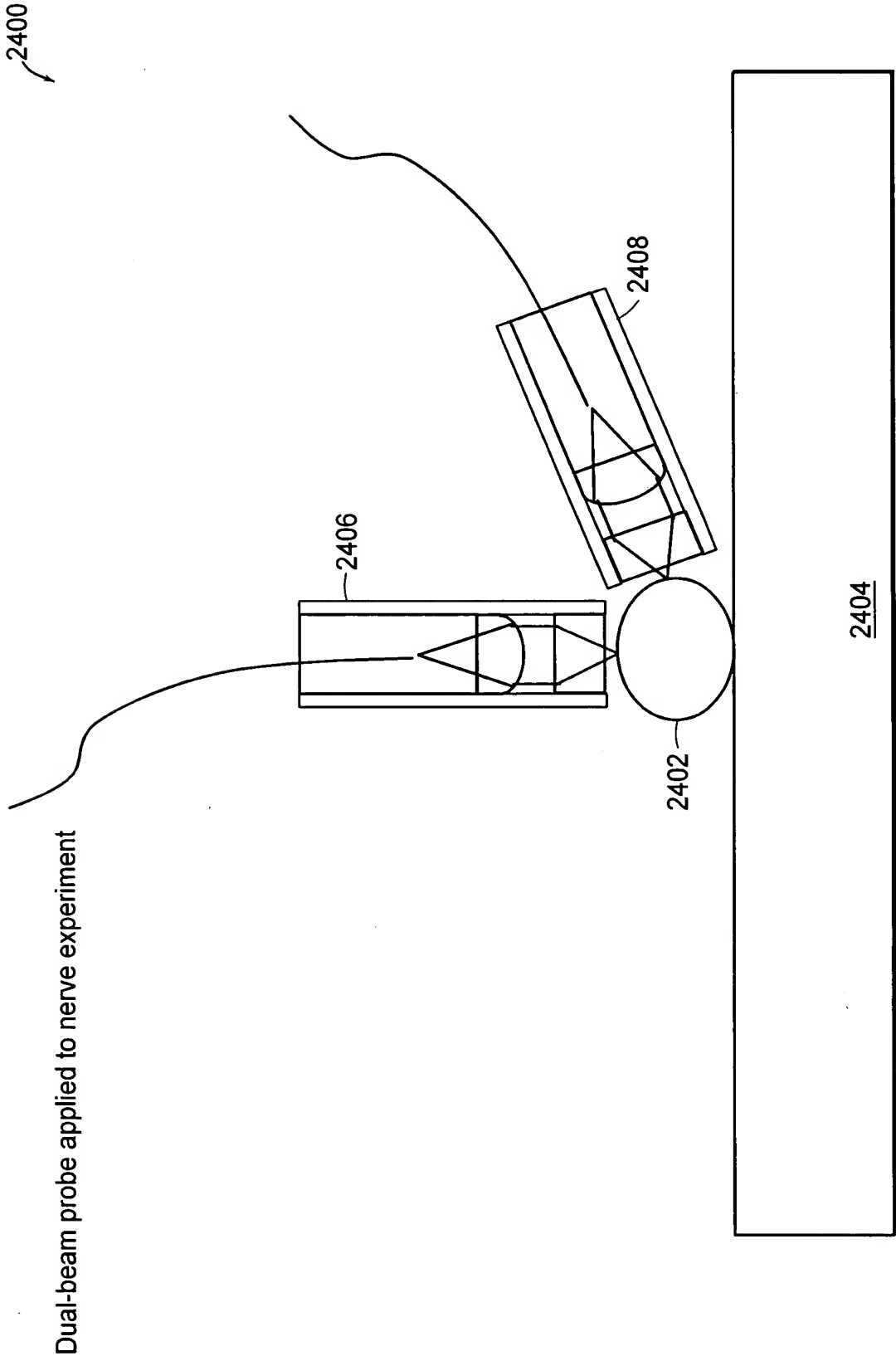


FIG. 44

50/74

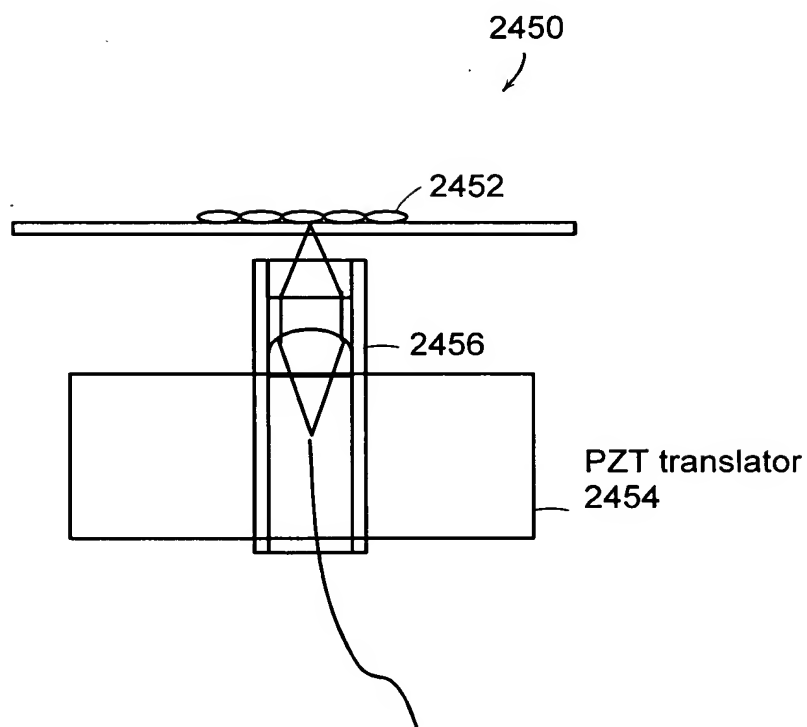


FIG. 45

51/74

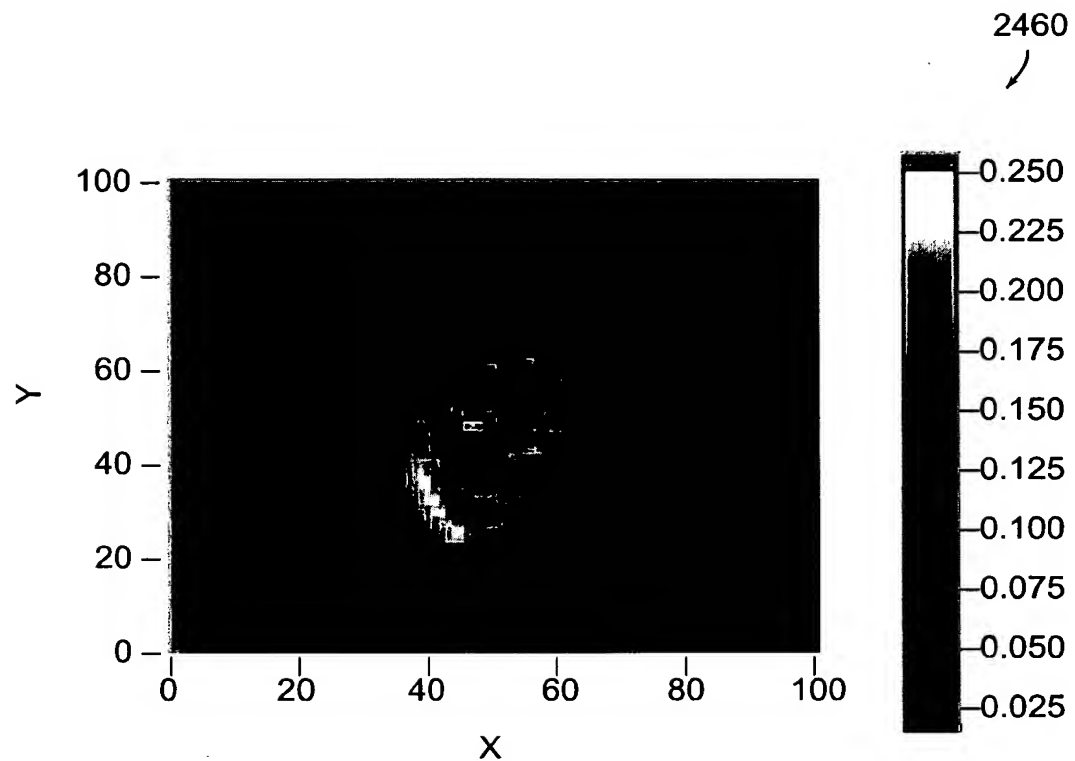


FIG. 46A

52/74

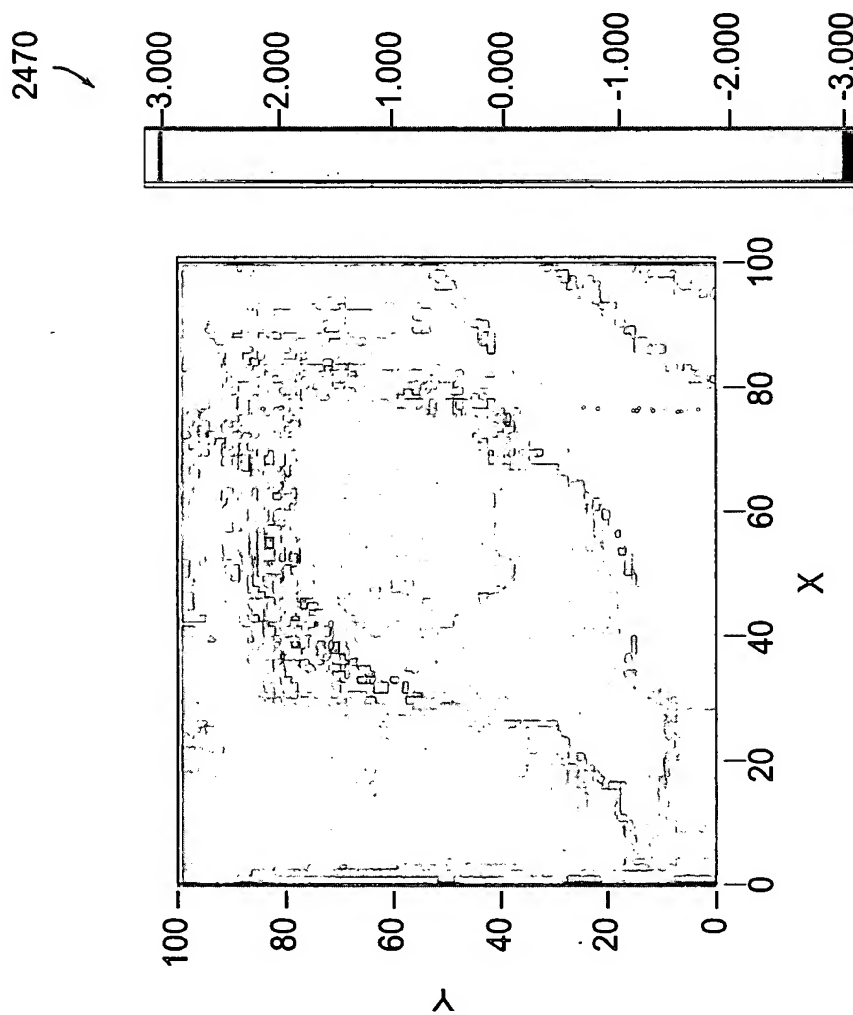


FIG. 46B

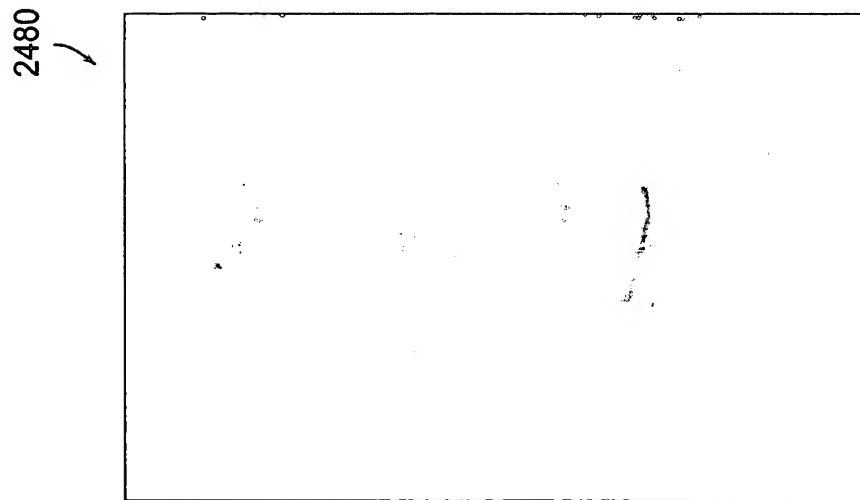


FIG. 46C

53/74

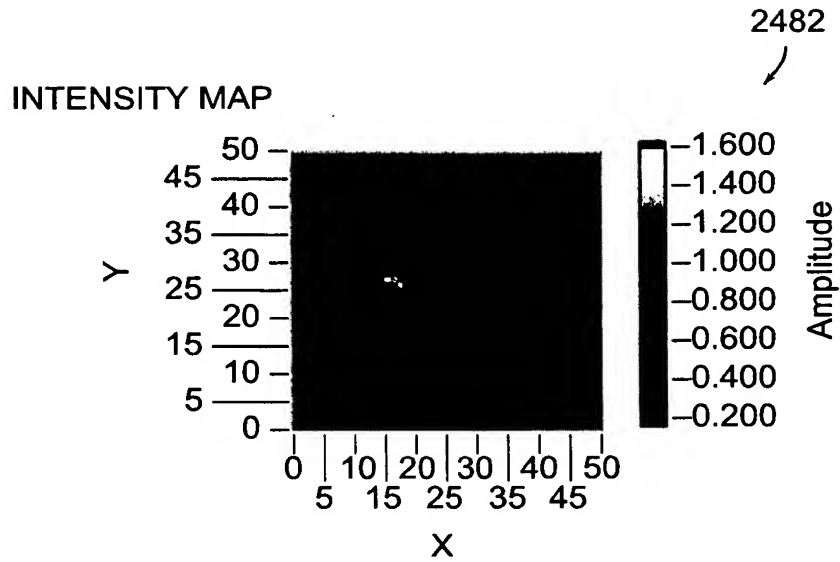


FIG. 46D

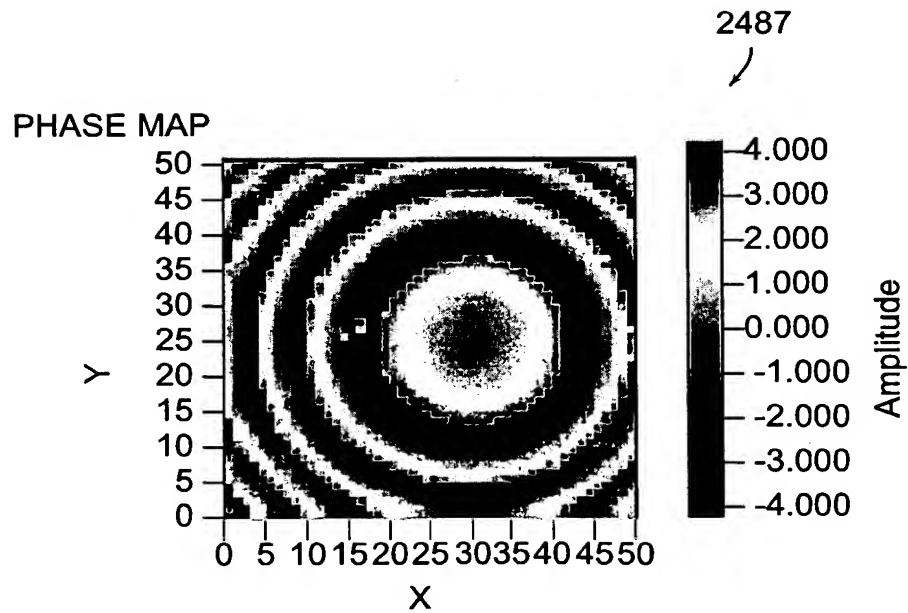


FIG. 46F

54/74

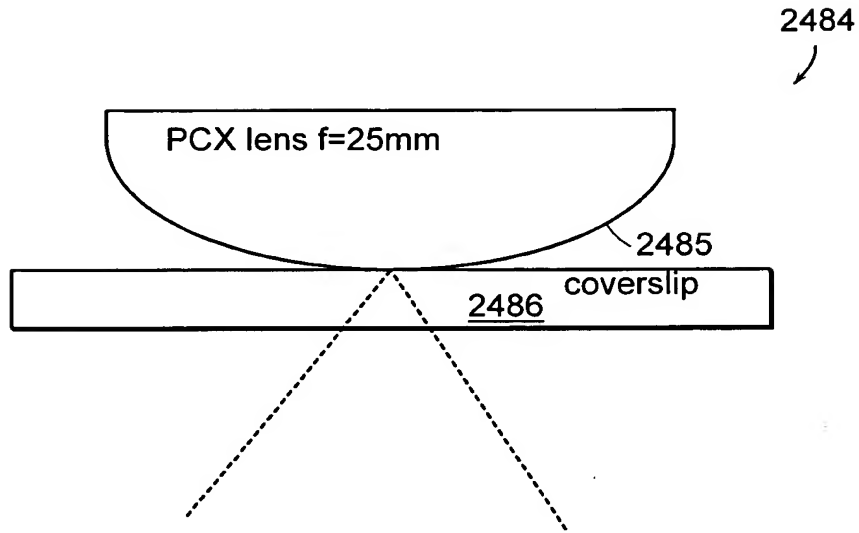


FIG. 46E

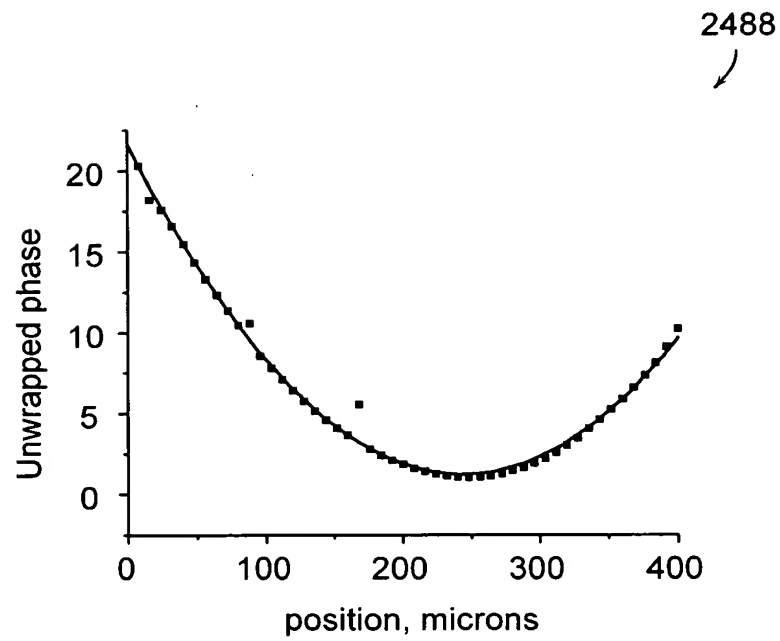


FIG. 46G

55/74

2490 ↗

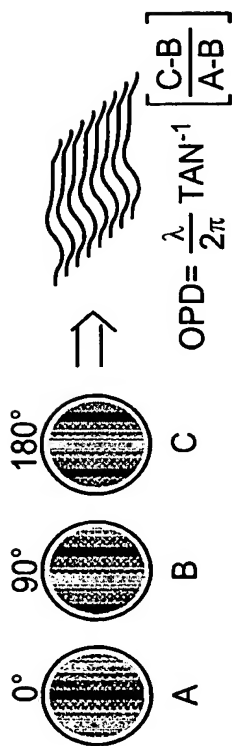
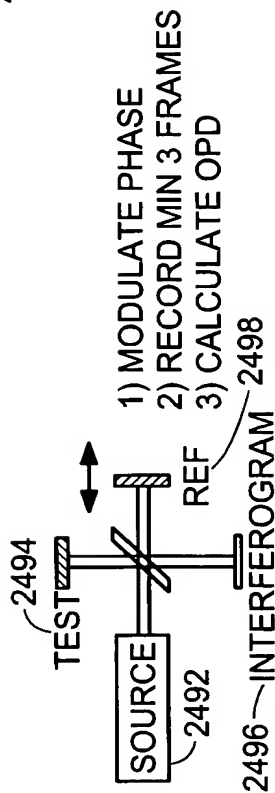


FIG. 47A

Phase stepping 2500 ↗

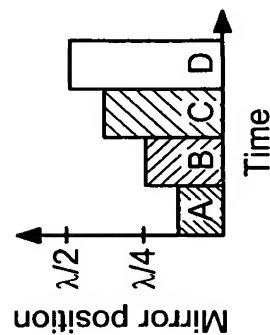


FIG. 47B

2510 ↗

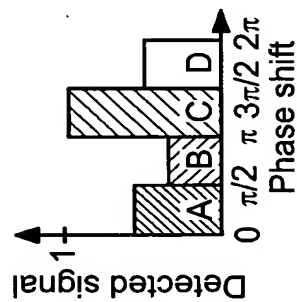


FIG. 47C

Bucket integration 2520 ↗

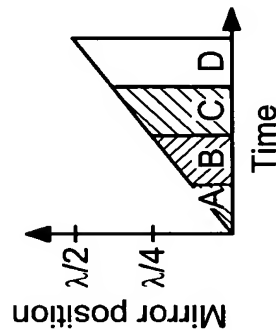


FIG. 47D

2530 ↗



FIG. 47E

56/74

Bucket integration

2540 ↗

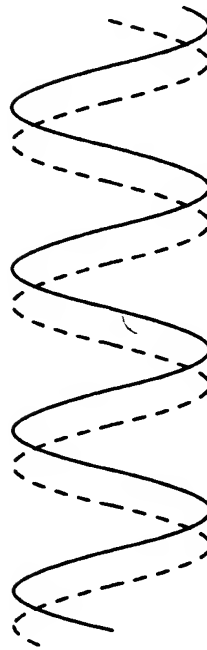


FIG. 48A

2550 ↗

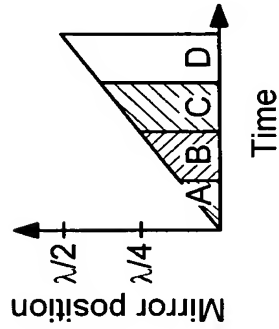


FIG. 48B

2560 ↗

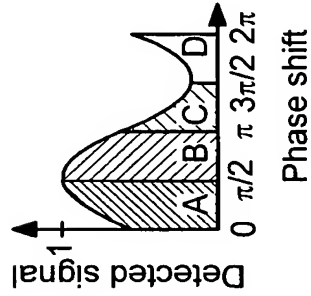


FIG. 48C



57/74

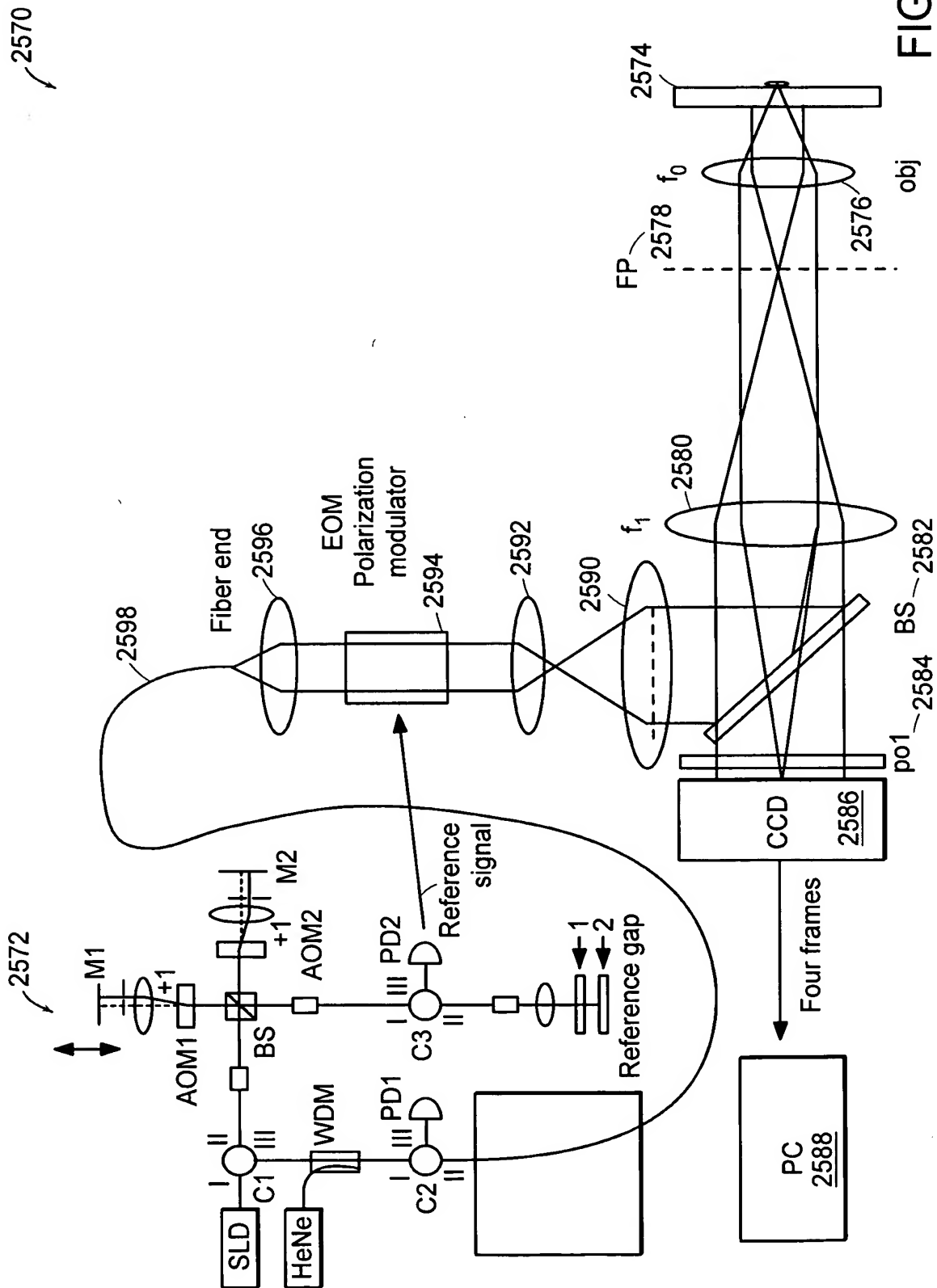
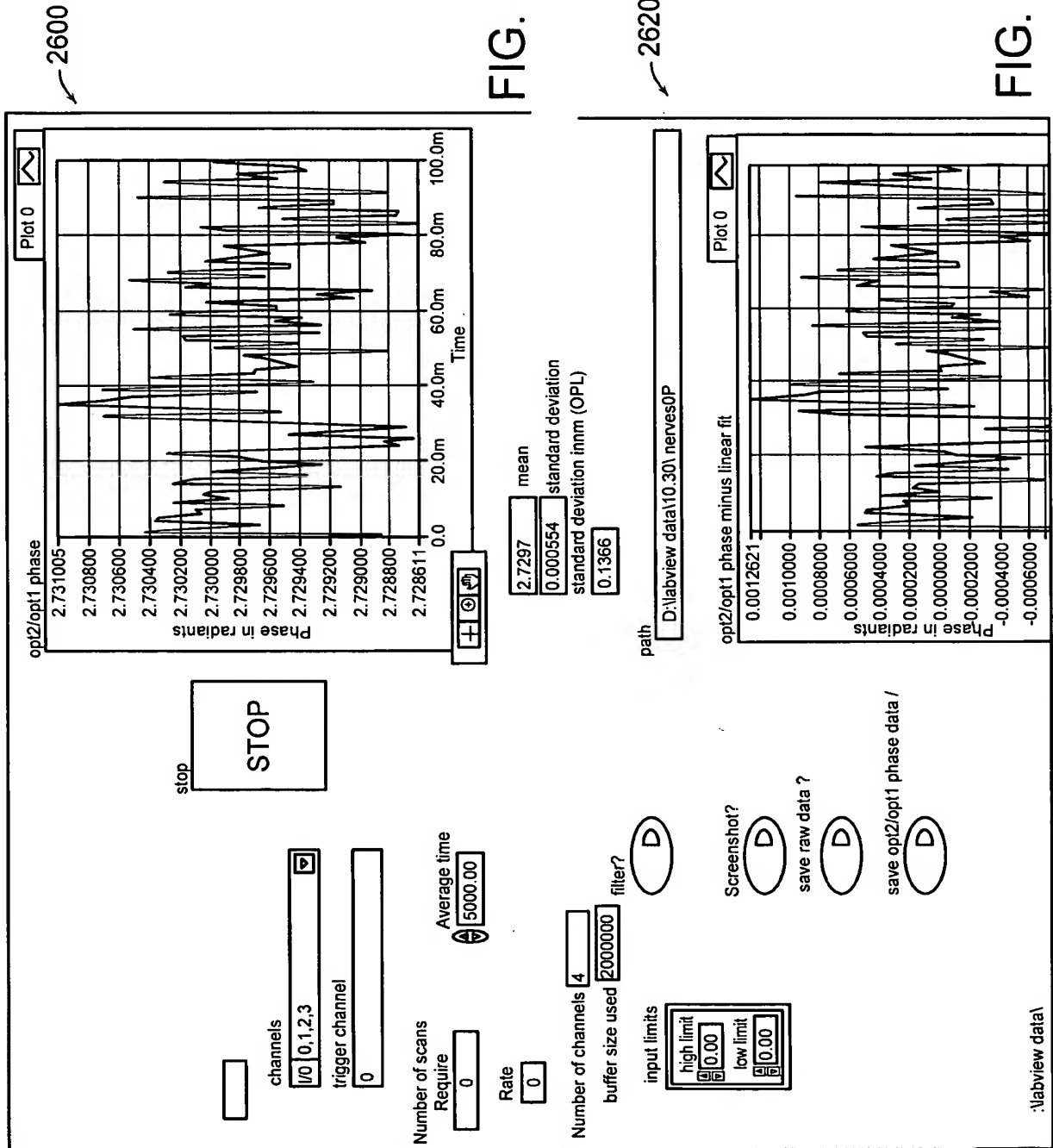


FIG. 49

58/74



59/74

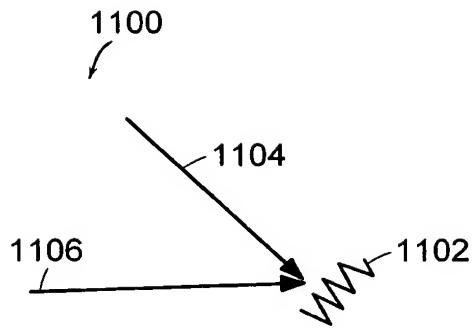


FIG. 51A

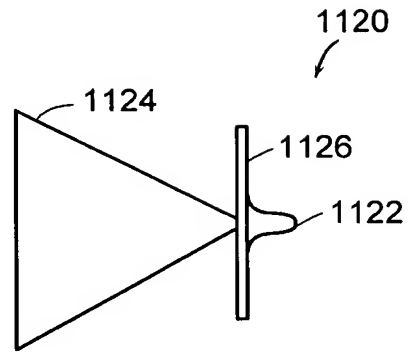


FIG. 51C

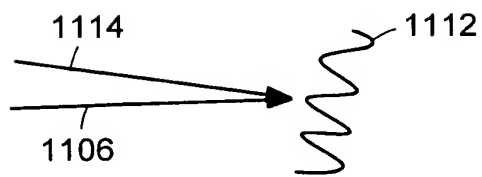


FIG. 51B

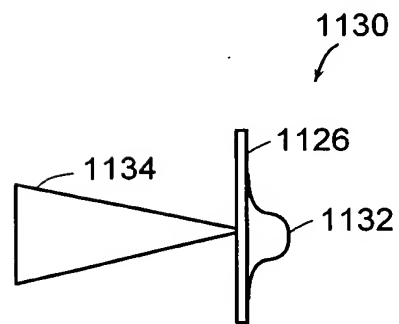


FIG. 51D

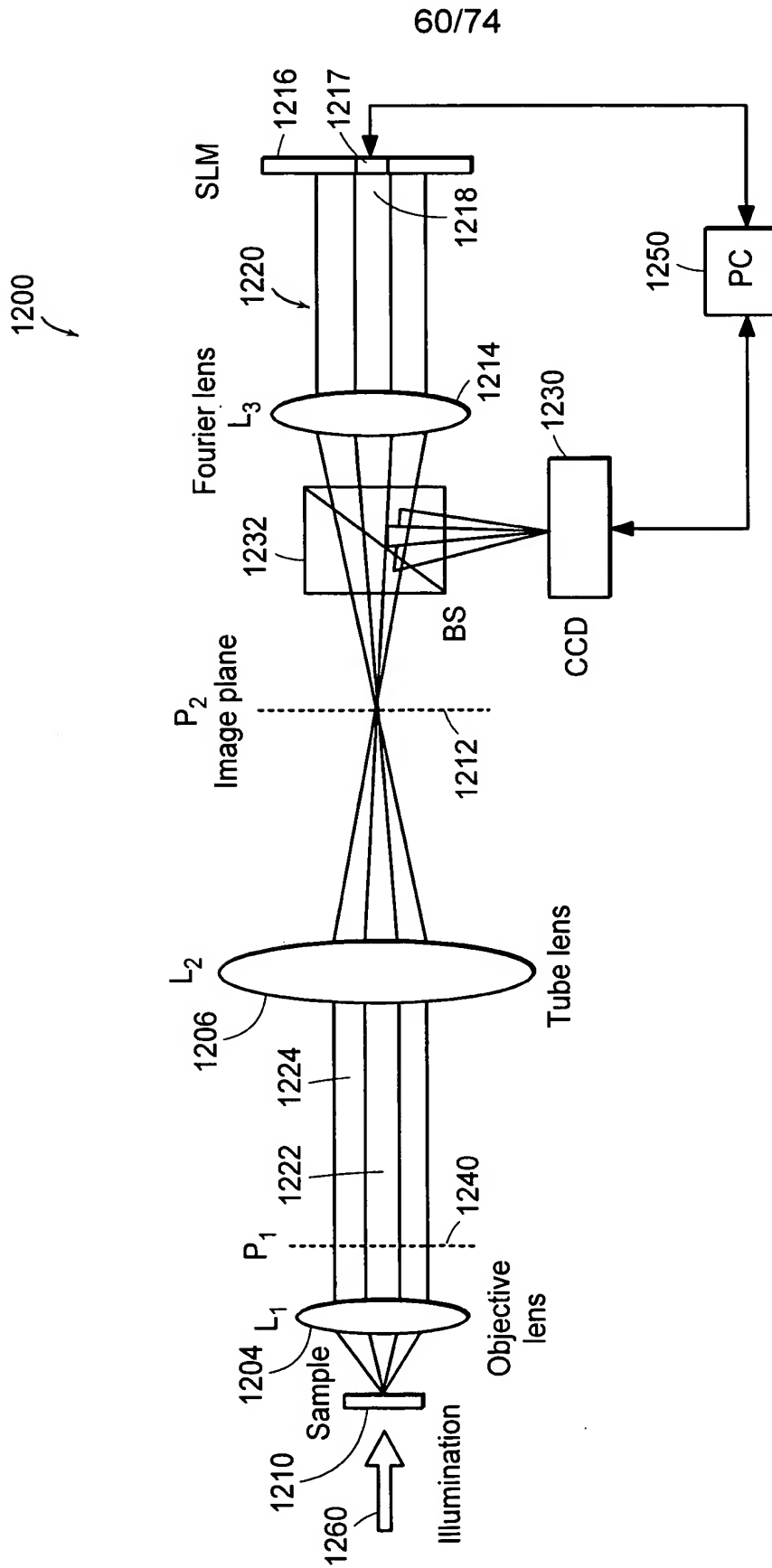


FIG. 52

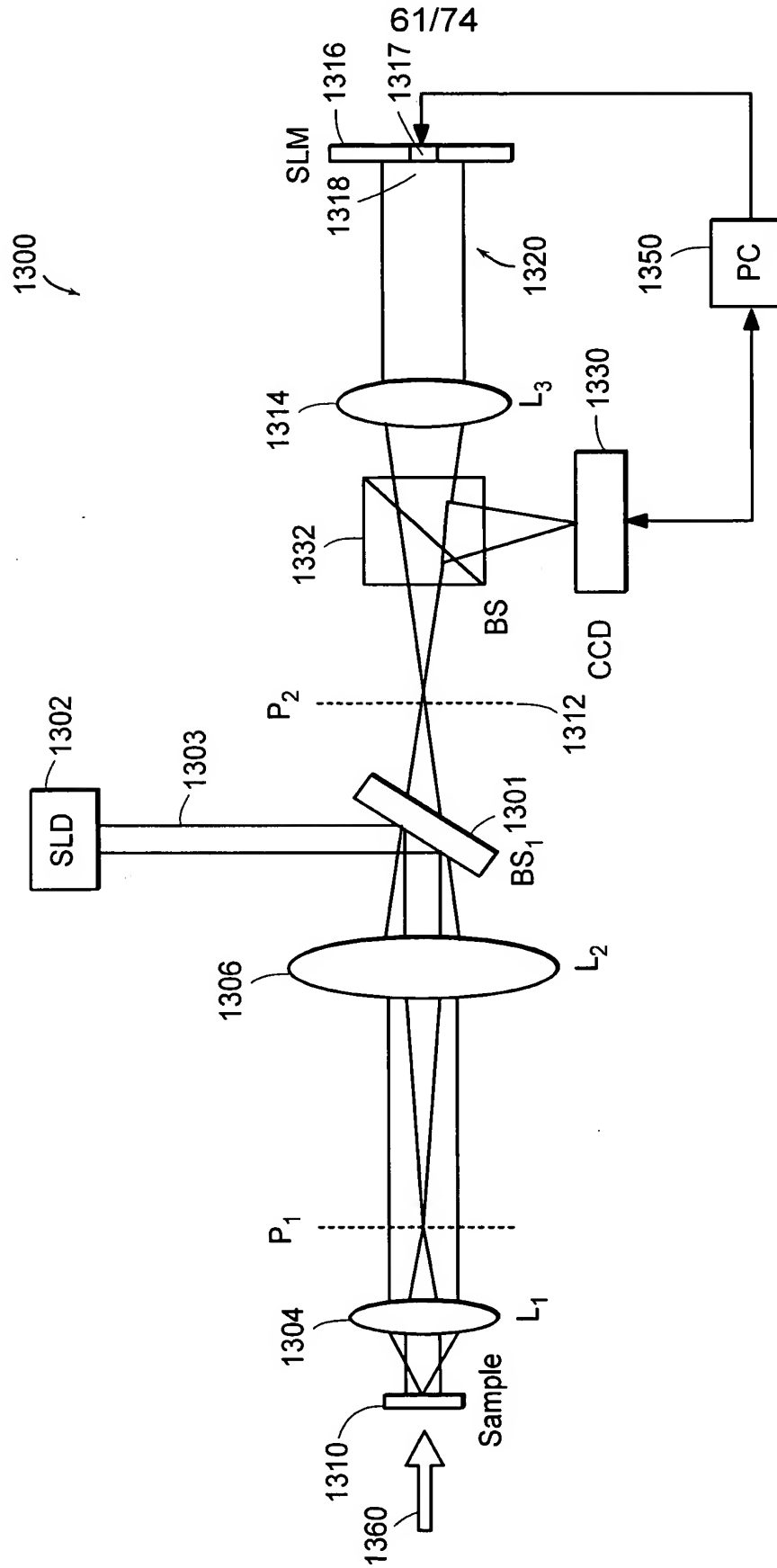


FIG. 53

62/74

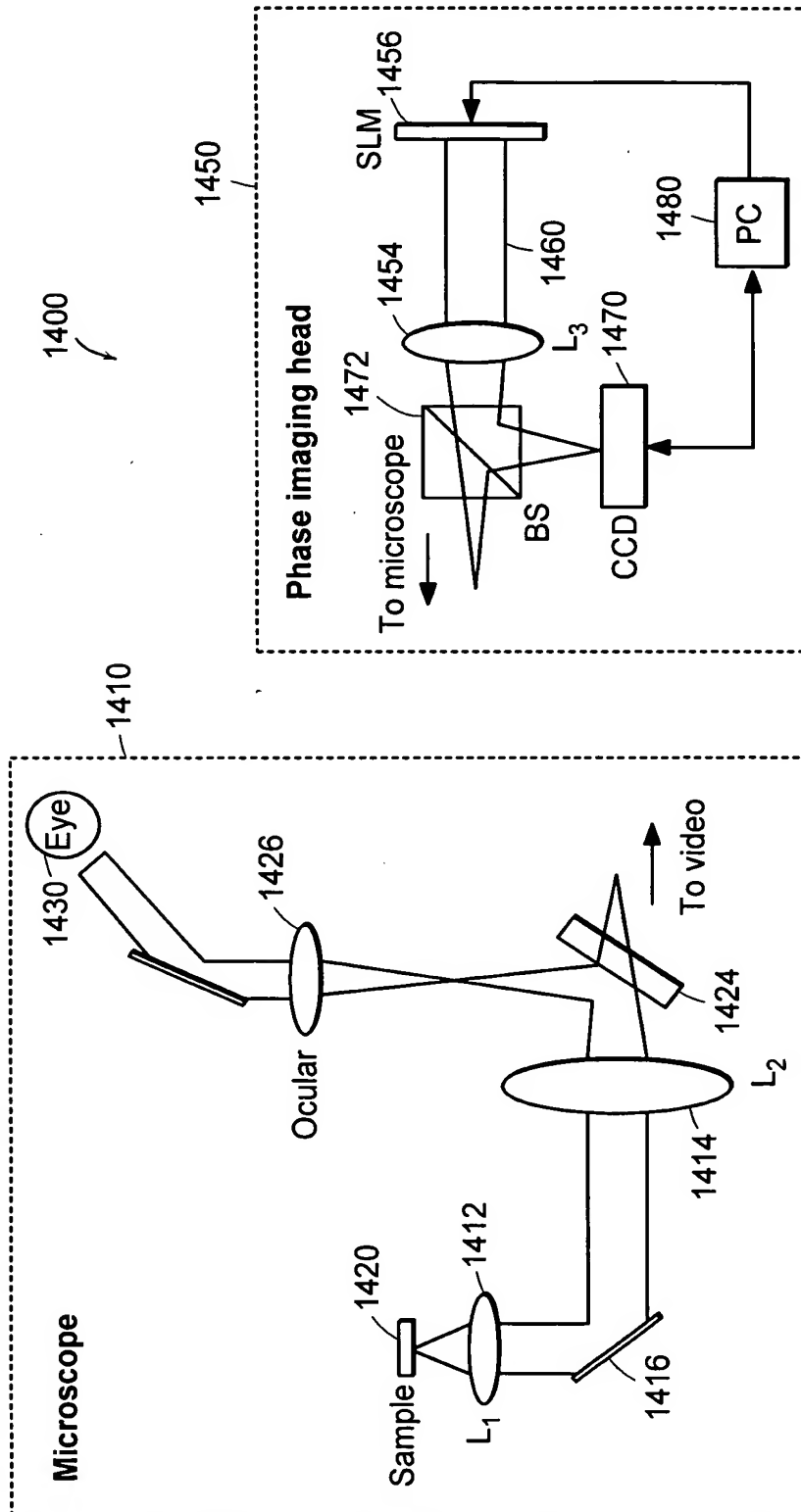


FIG. 54A

FIG. 54B

63/74

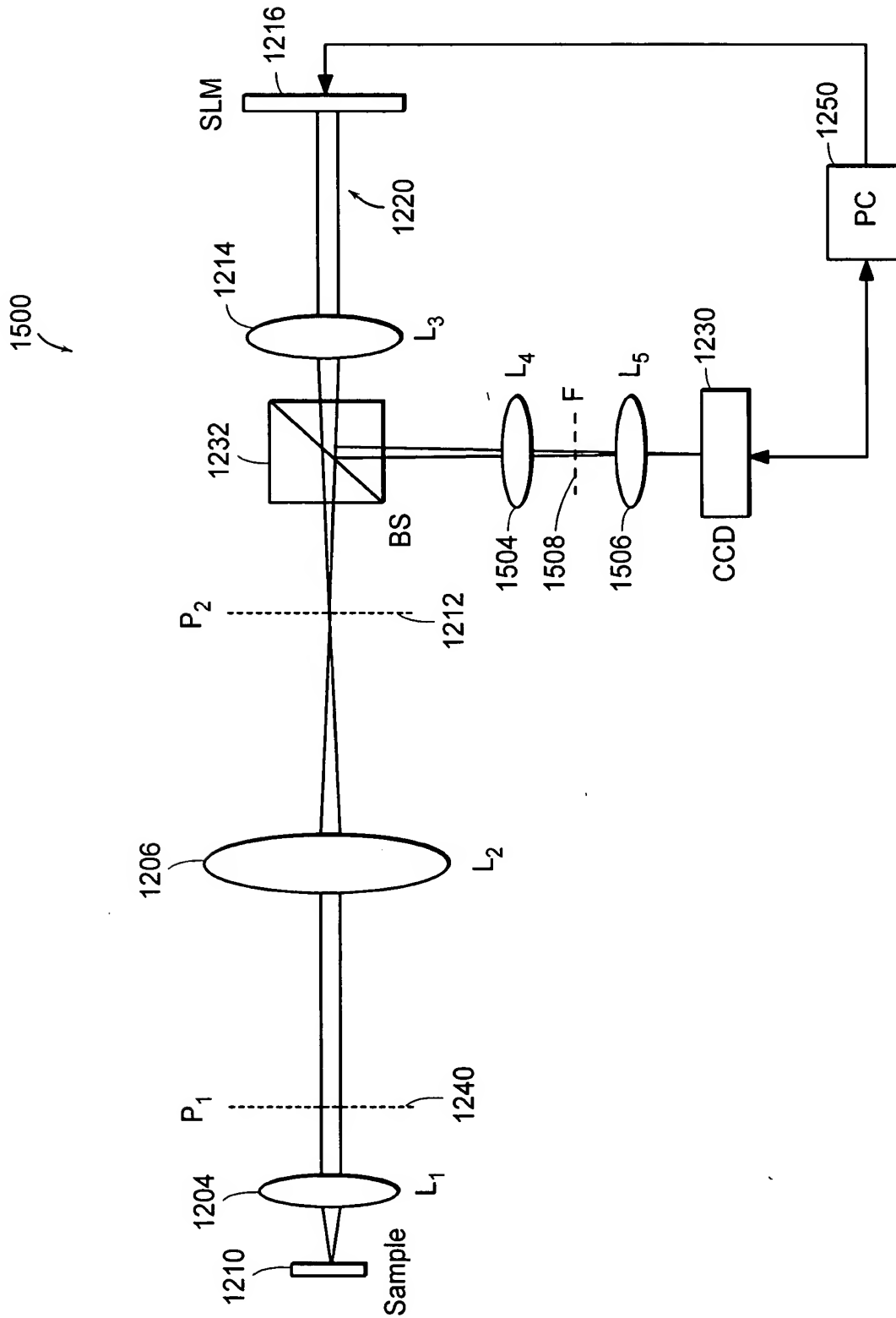


FIG. 55

64/74

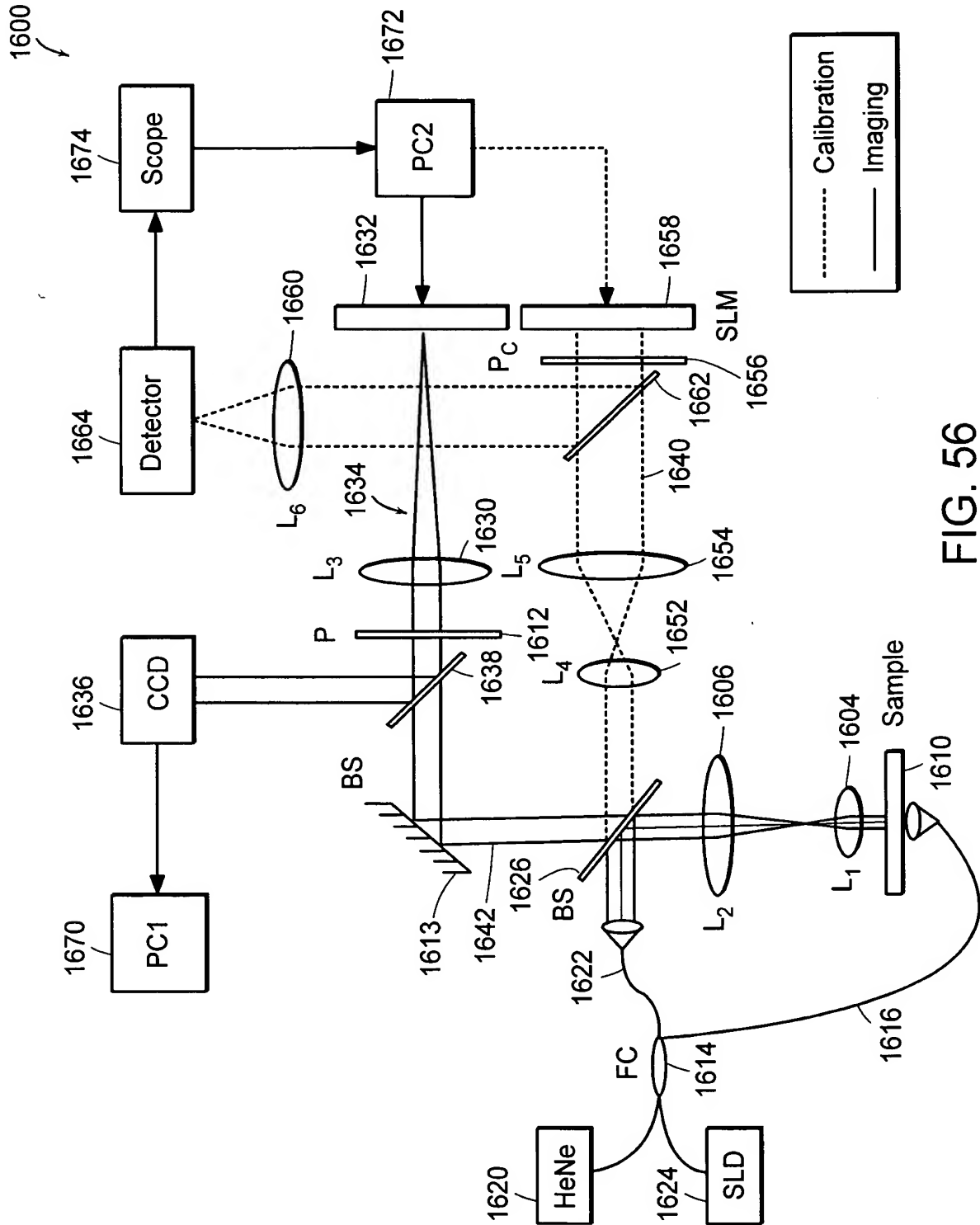


FIG. 56



65/74

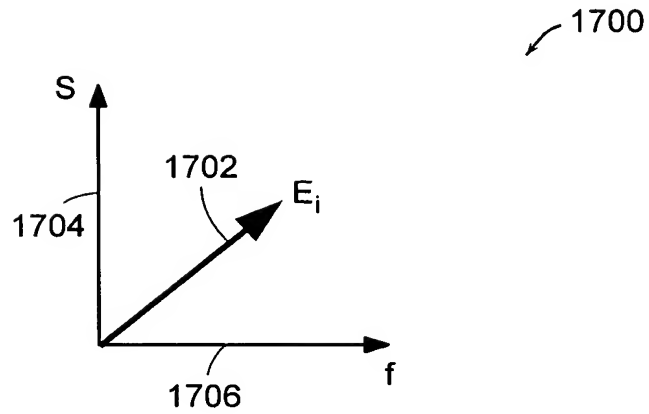


FIG. 57A

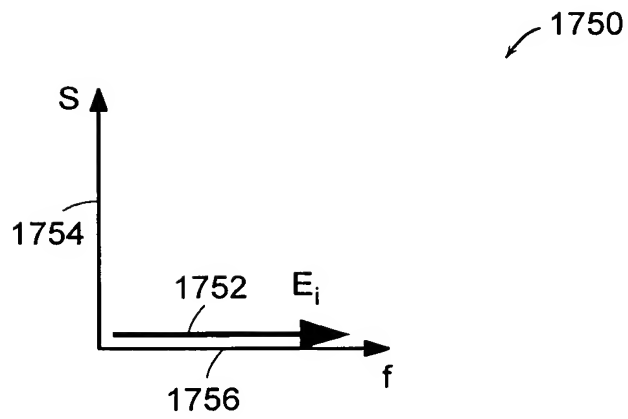
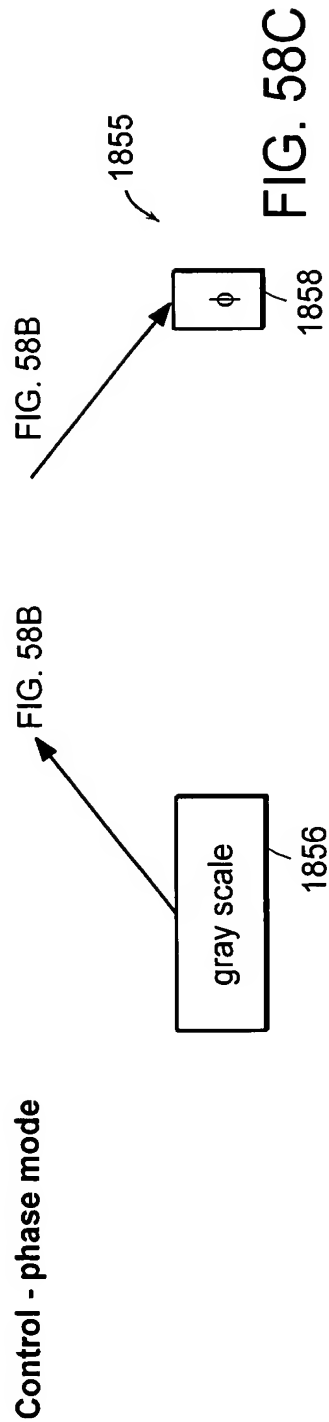
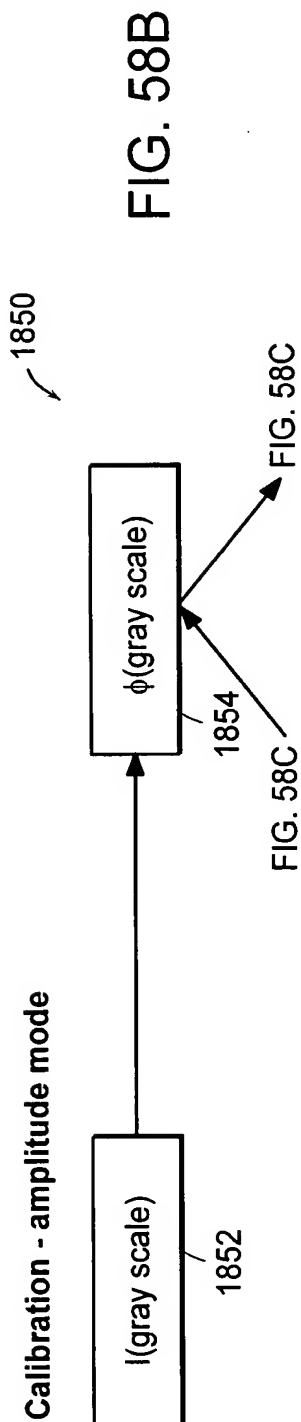
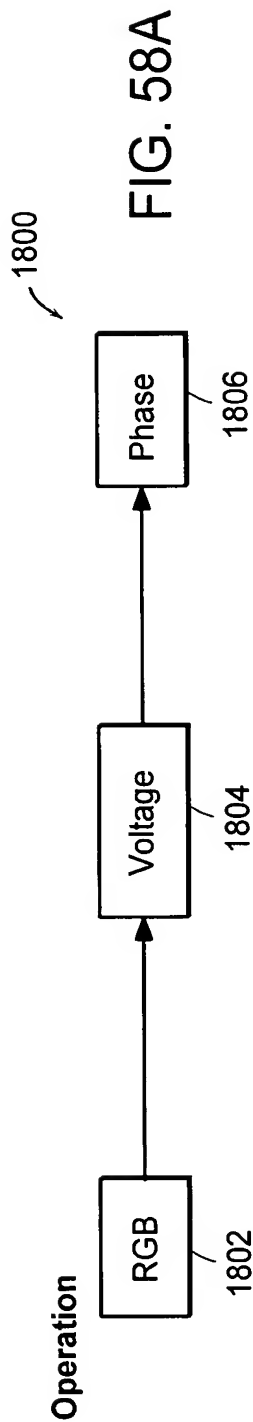


FIG. 57B

66/74



67/74

Calibration Lookup Table

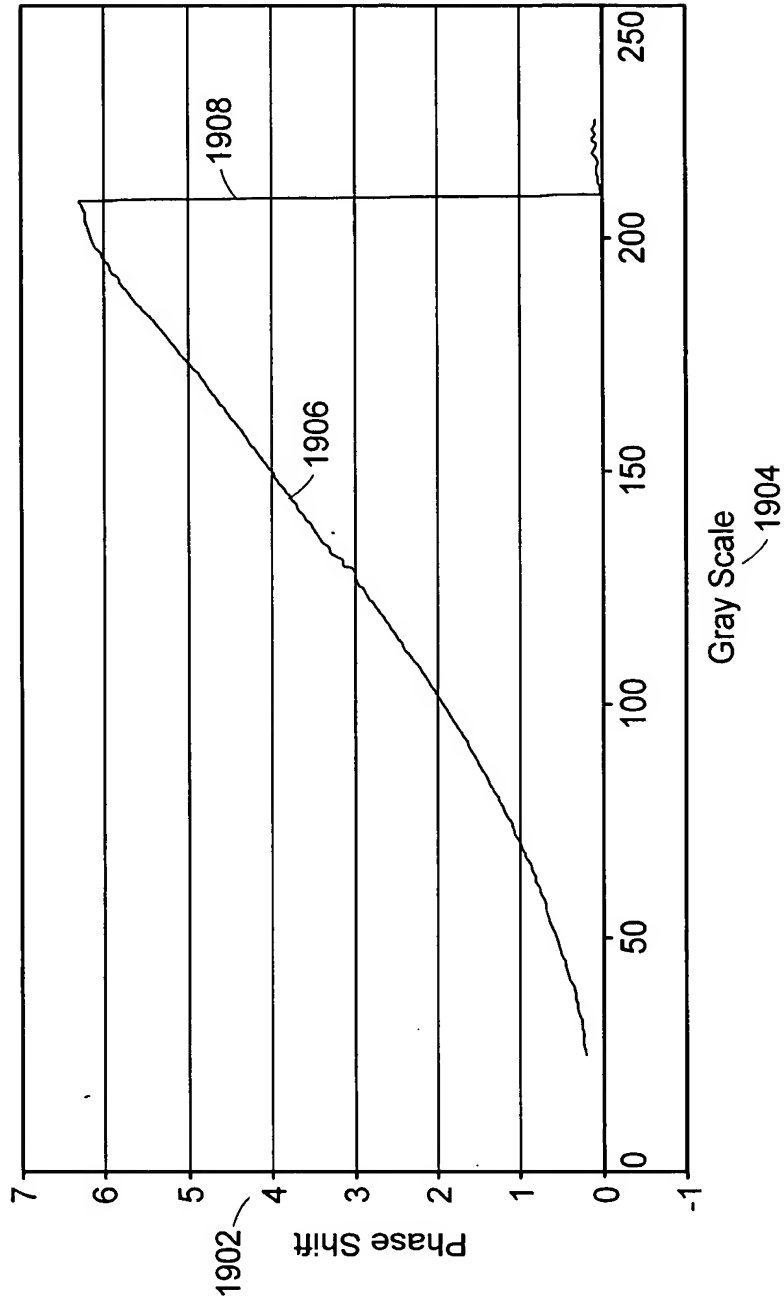


FIG. 59

68/74

4-frame sequence  
Magnification 13X

FIG. 60A



FIG. 60C

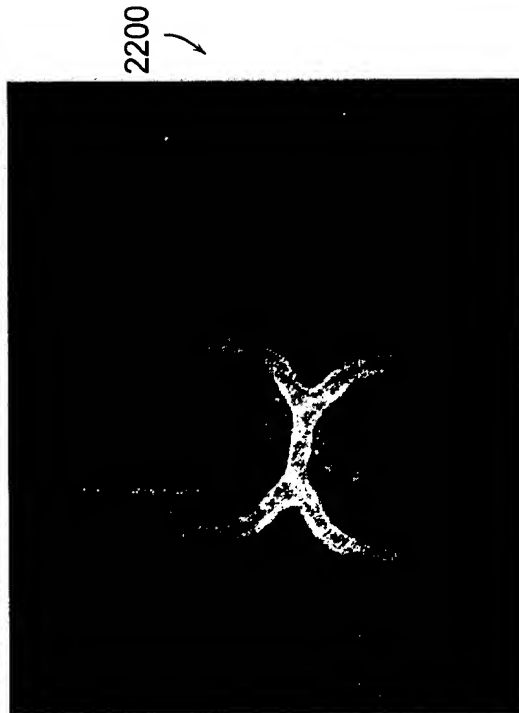


FIG. 60B

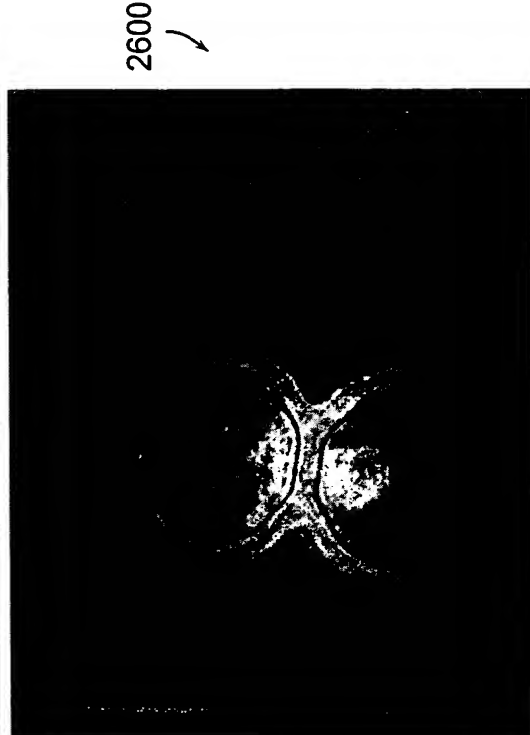


FIG. 60D

69/74

Phase between  $E_H$  and  $E_L$

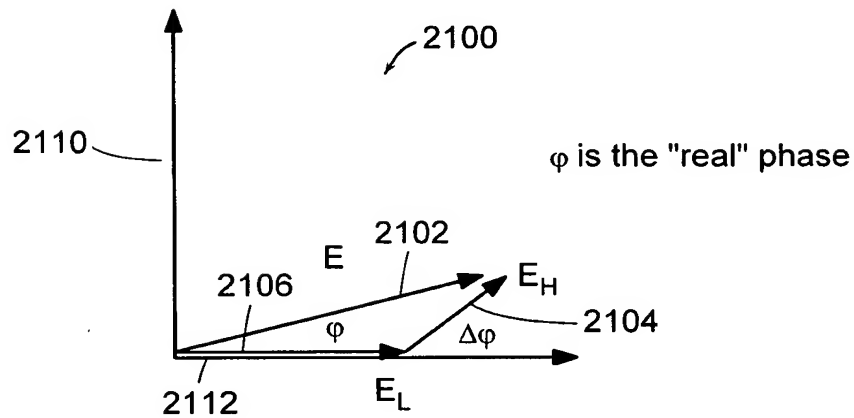


FIG. 61

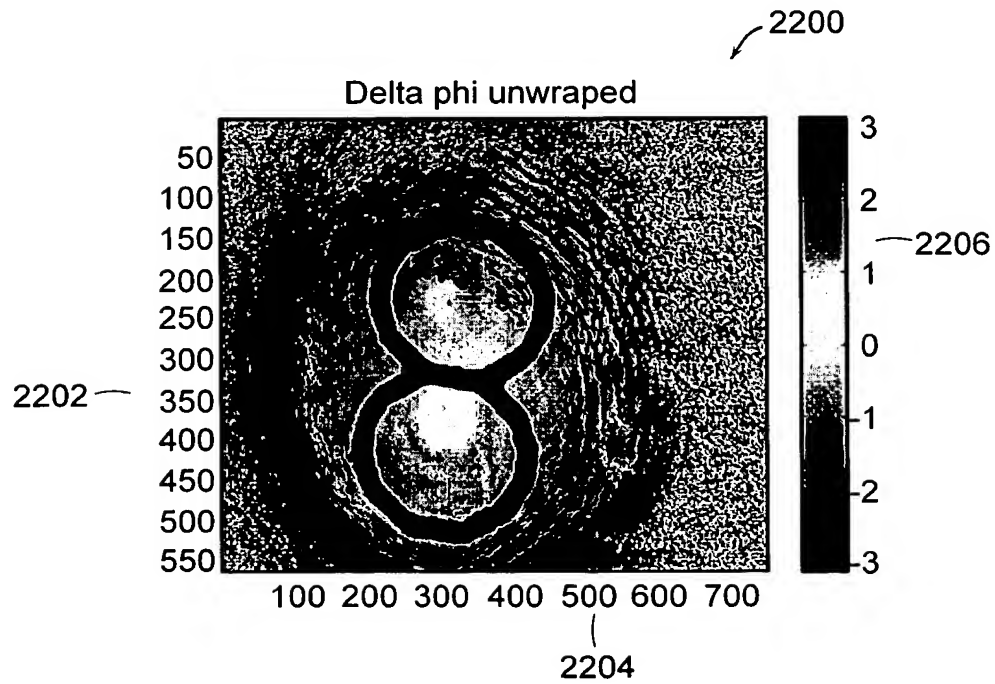


FIG. 62

70/74

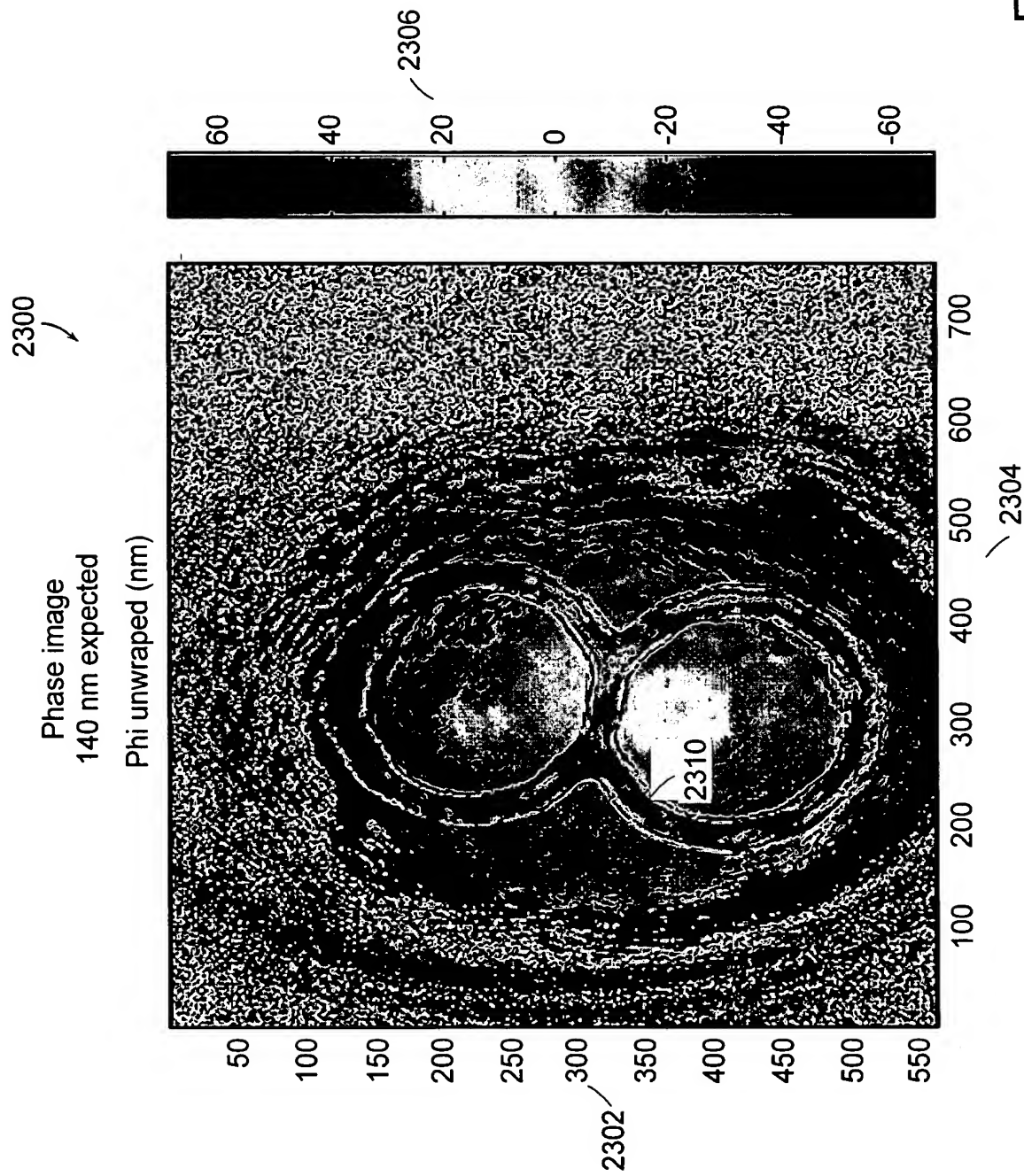


FIG. 63

71/74

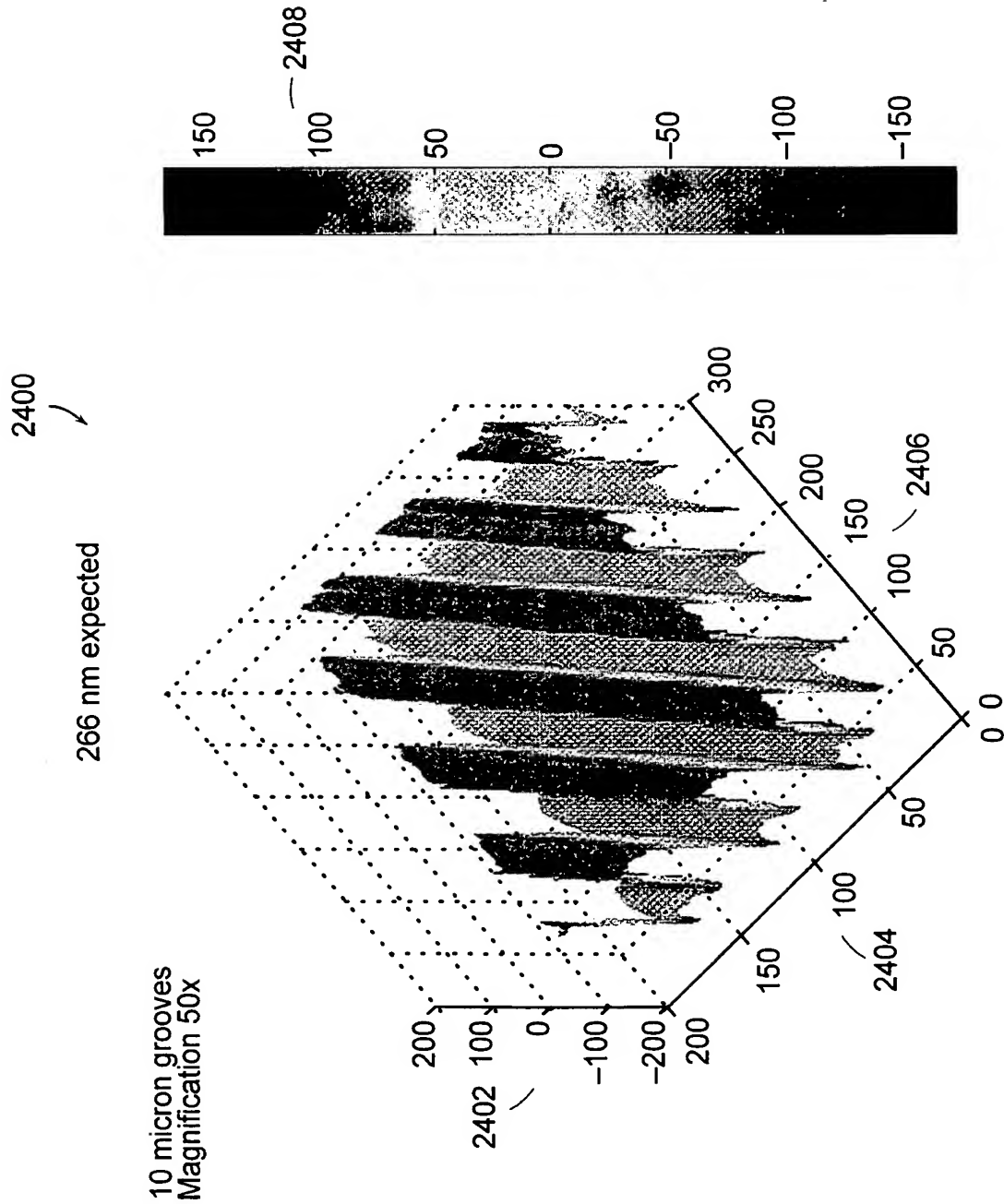


FIG. 64

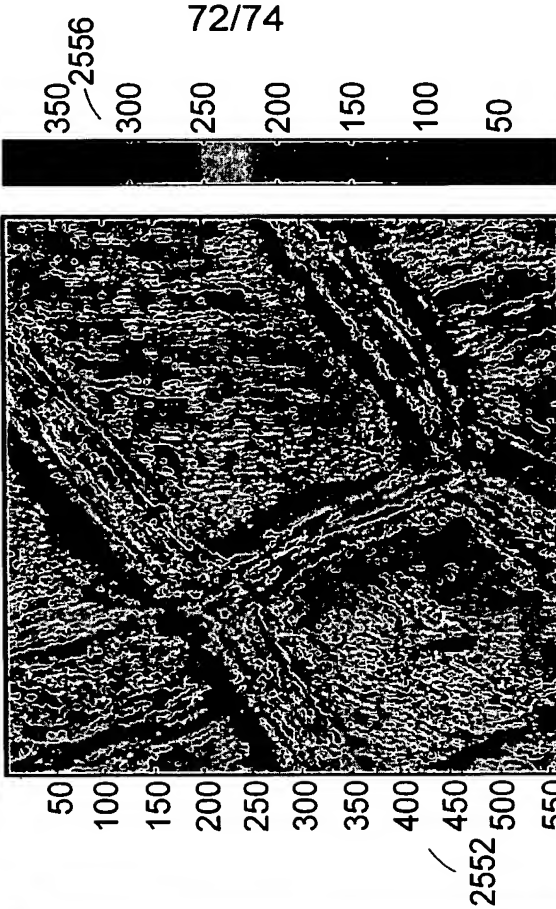
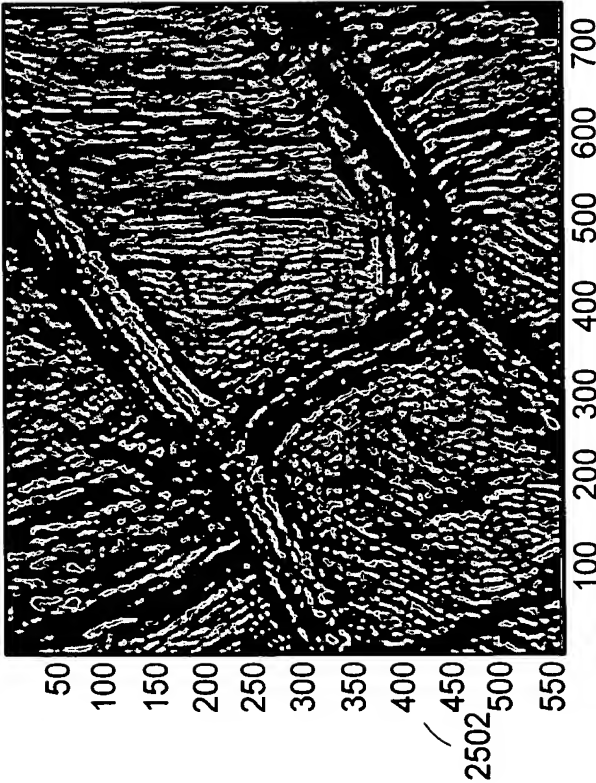
Onion Cells  
Magnification 50X

2500

2550

Microscope (intensity) image

Phase image



2504

2554

FIG. 65

FIG. 66



73/74

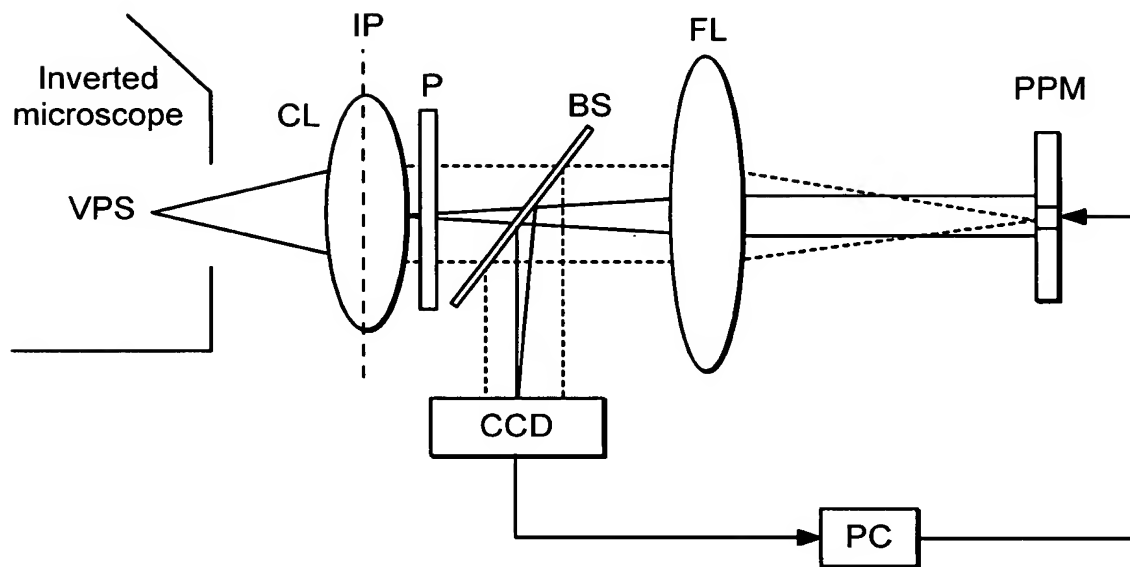


FIG. 67

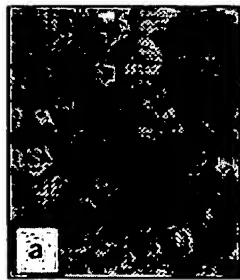


FIG. 68A

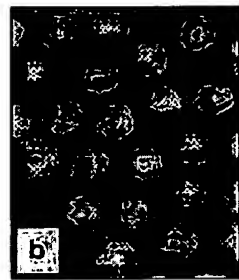
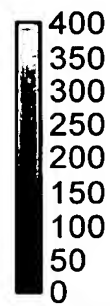


FIG. 68B



74/74

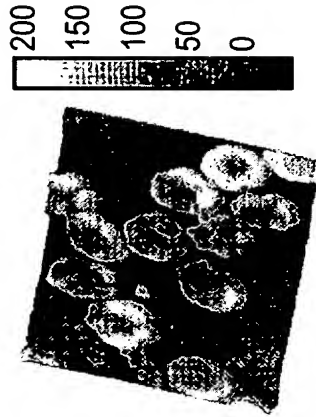


FIG. 69B

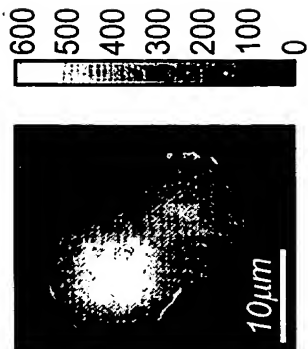


FIG. 69A

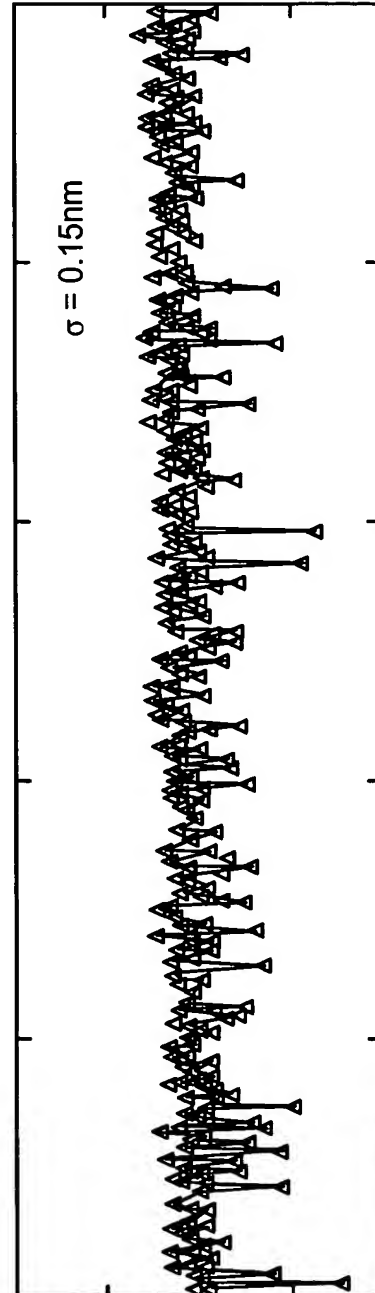


FIG. 69C

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